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THE PENINSULA OF YUCATAN

BY

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The flat peninsula of Yucatan, projecting northward like a thumb at the southern entrance of the Gulf of Mexico, is full of problems for the geographer. Some of these, such as the numerous "cenotes," or caverns which contain the only natural sources of permanent water, have been well described in the *Bulletin* and elsewhere. Others, such as the peculiar "storms" of minute earthquakes which at times shake the peninsula for days, are not yet understood nor are they widely known. And still others, such as the cause of the location in this region of the highest civilization which ever developed in America before the coming of Columbus, have been discussed for years, but have never been satisfactorily explained. A visit of two weeks to the peninsula during a journey to Mexico, on behalf of the Carnegie Institution of Washington in the spring of 1912, introduced the author to some of the chief problems, and has led him to write this paper for the purpose of briefly calling attention to them, without trying to describe the country as a whole, or to enter into elaborate discussions.

The position of Yucatan with respect to the rest of the world is highly isolated. Toward the south and east it is bounded by dense tropical forests which even in our day are penetrated neither by railway nor road. They can be traversed only along Indian trails, winding and crooked, and often coming blindly to an end. Even these poor apologies for paths are impassable except with the help of a party of natives armed with big machetes for cutting the young trees

and lianas, which grow with astounding rapidity. The inhabitants of the forests are limited to a few scattered bands of Indians in the lowest stages of civilization. Often the traveler may go for days without seeing a village or even a camp. On the north, east and west Yucatan is surrounded by water, but that does not make it accessible. The harbors on the east coast are said to be fairly good, but the country back of them is covered with dense forests like those on the south, and hence they are almost useless as means of getting at the important portions of the country. On the north the coast is

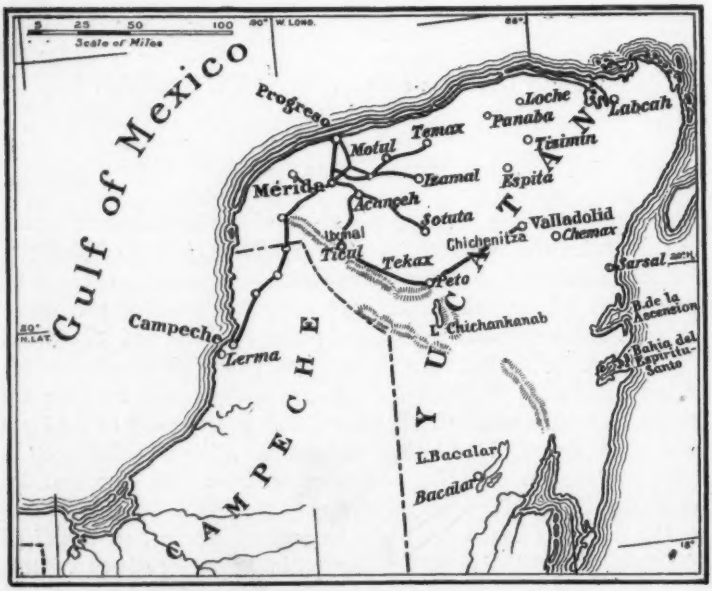

FIG. 1—Yucatan.

bordered by an almost continuous line of sand bars and lagoons. Within the lagoons the water is quiet and small boats can sail easily, but unfortunately it is not possible to go any great distance without meeting barriers which force the navigator to take to the open sea. There the waves raised by the prevailing trade winds blowing freshly from the northeast are so high as to make long voyages too dangerous to be commonly undertaken. As far as modern steamers are concerned conditions are no better. Like all newly uplifted coastal plains Yucatan is bordered by very shallow seas. The steamers of

the Ward Line, the only one plying regularly to the country, are forced to anchor three miles or more from land, and to send their freight and passengers ashore in a tug which pitches most disquietingly even in comparatively good weather. In bad weather it is often impossible to make a landing. On the west coast, known as Campeche, conditions are somewhat better because of less exposure to the winds, but the difficulties due to shallow water are not much different. Altogether the peninsula of Yucatan is a decidedly inaccessible region. No great trade routes touch it, its near neighbors

FIG. 2—The mouth of a "cenote."

on every side are backward, and there is little in its geographical position or in its degree of accessibility to permit of the stimulation which comes by contact with people of other ideas and habits.

Physiographically, as has already been implied, the northern part of Yucatan is a coastal plain newly uplifted from the sea. For scores of miles the general aspect of the country is absolutely flat. Near the center, low hills rise to a height of 300 or 400 feet, and farther south the relief becomes greater. The most noticeable ridge, so far as the inhabited portions of the country are concerned,

runs southwestward from a point about thirty miles inland from the northwestern corner of the peninsula. Its rounded hills are a prominent feature in the landscape as looked at from the plain to the east, but they are nowhere difficult to cross. Nevertheless they form a genuine barrier to civilization, largely because of their relation to water-supply, rainfall and vegetation.

Practically all of Yucatan is composed of soluble limestone. This has given rise to one of the most widely known features of the country, that is its underground drainage and "cenotes" or caves. The topography is almost universally of the type known as "karst." The karst, however, is not of the kind most commonly known, for in Yucatan we have to deal with a level plain instead of with a region of considerable relief. Because of the flatness of the country and the porous nature of the soluble limestone such a thing as a river is unknown. Not even a brook is found in the whole region, and naturally there are no valleys either. The only break in the flat monotony is afforded by innumerable little hillocks five to fifteen feet high. They lie in no regular order, being merely the remnants which happen to have been left between depressions in which a little water gathers in the rainy season. The water stands in pools for a while, and by so doing tends to dissolve the hollows to a deeper level. Only rarely does the water of one hollow run over into another, and even then not in sufficient amounts to make real running streams. Such being the case, the drainage of the country is naturally confined to underground channels. Often the concealed waters dissolve large caves, whose tops sometimes have fallen in, exposing the water at a depth of anywhere from twenty to a hundred feet, and thus giving rise to the "cenotes." These broken-down caves are of great importance to the inhabitants, for, as has already been said, they are the only places where a permanent supply of water is obtainable naturally throughout the year. At the time of the coming of the Spaniards all the native inhabitants, the Maya Indians, are said to have been clustered around them. Having no iron tools the primitive Mayas were unable to dig wells. To-day wells can be dug almost everywhere with full assurance of striking an abundant and unfailing supply of water. The only difficulty is that in the hilly regions the wells have to be sunk to a depth of from 100 to 200 feet, and the labor involved is sufficient in many cases to prevent the inefficient people of the tropics from making the attempt. Where ground water lies at a depth of only twenty or thirty feet, as in most parts of the plain, wells are numerous. In many cases the water is

raised by windmills which seem to rise like a forest when one looks from a distance at such a town as Merida, the capital. During recent years, when Yucatan has grown rich from the henequen or sisal fiber industry, pumps run by gasoline or steam have in many places appeared.

Climatically, as well as in other ways, Yucatan is relatively simple. It lies in the trade wind belt from about 18°10′ to 21°30′ N. In winter the brisk winds from the ocean pass over the land without giving up much moisture. The sky is clear a large part of the time, and although some rain falls in every month the amount in the northern parts is insignificant. Farther south, however, where the hills begin to rise, the rainfall increases rapidly, and showers are quite frequent even in the dry season. The temperature in winter is agreeable, being rarely extremely warm and never cold according to the ideas of people from the north. There is, however, considerable variety, especially when the so-called northers blow. These appear to be connected with the cyclonic storms of the United States. The winds blow violently from the north and reduce the temperature to the lowest points ever reached. The minimum, however, is rarely below 10° C. (50° F.), while the maximum, even in winter is usually above 30° C. (86° F.), and may rise above 40° C. by the end of March. In summer, as might be expected in this latitude, the maximum temperature is scarcely higher than in winter, although the minimum does not fall so low. The zone of subtropical rains exerts its accustomed influence and gives rise to heavy tropical showers. How greatly the summer rainfall exceeds that of winter may be seen from the accompanying table which gives the average monthly rainfall for the 15 years from 1896 to 1910 inclusive at Merida:

MONTH	RAINFALL IN INCHES	MONTH	RAINFALL IN INCHES
January	0.88	August	8.48
February	0.68	September	4.46
March	0.58	October	3.04
April	0.74	November	1.94
May	1.70	December	1.36
June	5.61		
July	4.90	Total	34.37

The seasonal variation of rainfall is no more striking than its variation from region to region. In the north the rainfall is slight, being at a minimum on the coast in the neighborhood of Progreso. Here in 1911, the only year for which statistics are at hand, the precipitation amounted to 13.5 inches. From 15 to 20 miles inland, at

such places as Merida, or Motul and Temax (Temásh), which lie farther east, the precipitation for the same year was 35.7, 37.6, and 34.8 inches respectively. Still farther inland at places varying from thirty to ninety miles from the coast the figures are: Izamal, forty miles due east of Merida 49.2 inches, Espita, nearly as much again to the east 48.7 inches, Tekax, fifty miles south-south-east of Merida 53.3 inches, and Peto about thirty miles southeast of Tekax, but not so close to the hills, 47.7 inches. Finally to the east and south of the places already mentioned we find an area of still larger rainfall, exemplified by Valladolid, which lies a hundred miles east-southeast

FIG. 3—An Indian hut on the edge of the jungle.

of Merida and about fifty miles from the Caribbean Sea, and had a rainfall of 66.8 inches in 1911. Beyond this point, to judge from the vegetation, the precipitation becomes still greater. The cause for the variation in rainfall is two-fold. In the first place the presence of hills in the south and southwest on the one hand, and the proximity of the east coast to the open Caribbean Sea with its moist east winds, on the other, give those regions more rain than has the north coast and northern interior. In the second place we are here

near the edge of the area reached by the zone of subequatorial rains. Hence the amount of these rains increases rapidly toward the equator.

With such marked changes in the amount of rainfall from place to place, it is evident that the vegetation must vary greatly, and this in turn must profoundly affect the conditions of human life. In works on botany it is common to emphasize the distinction between

FIG. 4—The tropical forest.

tropical jungle and tropical forest. Nevertheless in the mind of the average geographer, if I may judge from my own experience, and still more in the mind of the layman, the distinction between the two often lacks sharpness. There is a still greater lack of appreciation of the significance of the two in reference to man. In Yucatan jungle and forest lie close together in such a fashion that they can

readily be compared. In the center of Yucatan lies a long narrow lake called Chichankanab, one of several which occupy hollows in the limestone of the southerly, more hilly portion of the peninsula. It is about a hundred miles east of Campeche, a hundred west of the Caribbean Sea, and a hundred south of the northern shore of the peninsula. If lines be drawn northeastward and northwestward from the lake to the corners of the peninsula they will include approximately the entire area of the Mexican administrative province of Yucatan, comprising about one-fifth of the whole peninsula. This small area, together with a strip of the west coast reaching down toward Campeche, comprises the jungle-covered portion, while the rest is covered with genuine tropical forest. The western boundary of Yucatan proper is nearly coincident with the small range of hills already mentioned as the most noticeable feature of the relief. The eastern boundary appears to be less distinct, although I have not seen it and cannot speak with assurance. Where jungle prevails the rainfall seems not to exceed fifty inches, while in the forested area it rises far higher. How great it is we do not know, for Valladolid, with nearly 67 inches in 1911, is the only station whose figures I can find, and it lies on the relatively dry edge of the forest, not in its moist interior.

The distinction between jungle and forest is simple. Large trees demand that the soil in which they stand shall not be dry for any great length of time during the growing season. Inasmuch as the growing season lasts almost the entire year in the tropics, large trees will not flourish in such a way as to form dense forests unless abundant rain falls at most seasons, although they may grow sporadically here and there. Smaller, more drought-resistant species, however, as well as bushes, are much less exacting in their demands for moisture. Some of them will grow almost anywhere if the ground is well moistened for two or three months during some portion of the year. In regions like Progreso, where the rainfall is only from ten to fifteen inches and is concentrated largely in the summer, the long dry period of winter prevents the growth of anything except small bushes six or eight feet high. These, however, thrive in abundance so that the country is well covered with vegetation and is everywhere bright green in summer. In the dry winter, however, the leaves fall off and the landscape would be quite like that of a thick bushy pasture in the United States were it not that in March or April some of the bushes bear brilliant red, yellow or white flowers. As one goes inland from the north coast to regions of greater rain-

fall the size of the bushes gradually increases and small trees appear. Even at the southern limit of jungle, however, at places like Tekax and Peto the diminutive limestone hillocks or the larger hills of the range bordering the administrative province of Yucatan are covered with a low scrubby growth. Some trees rise thirty or forty feet, and many twenty feet. There is nothing, however, to suggest the deep, somber forest. Small growths not over twenty feet high and with stems only three or four inches in diameter predominate. The aspect is like that of a second growth of timber in the northern United States fifteen or twenty years after the cutting of the original forest. A few bushes and even an occasional tree of some special species may remain green throughout the year, but most become as bare as northern trees.

From the jungle to the forest the transition is rapid. A day's ride on horseback is sometimes sufficient to take one from a well developed sample of one to an almost equally well developed sample of the other. The forest is of the kind whose descriptions are so familiar. Many trees remain green throughout the year. The trunks rise to heights of fifty or sixty feet even on the borders of their province, and at the top the leaves form a canopy so that the ground is usually shady. Until 9 or 10 A. M., the rays of the sun, even in the drier months when a portion of the leaves have fallen, scarcely reach the ground. Even at high noon the sunlight straggles through only in small patches. Long, sinuous lianas, often queerly braided, hang down from the trees; epiphytes and various other parasitic growths add their strange greens and reds to the varied complex of plants. Young palms grow up almost in a night, and block a trail which was passable a few days before. Wherever the death of old trees forms an opening, hundreds of seedlings begin a fierce race to reach the light and strangle their competitors. Everywhere the dominant note is intensely vigorous life, rapid growth, and quick decay, as befits the warm moist air which rarely varies and never is so cold or dry as seriously to interfere with the development of the most sensitive types of plants.

Before discussing the effect of the vegetation and of other conditions on man, a word as to the relation of the karst to the vegetation. It is sometimes stated that the paucity, or rather the small size and xerophilous character of the vegetation of northern Yucatan is largely due to the dryness of the soil occasioned by the draining away of the water through the caves and underground channels. Undoubtedly this is an important factor, but I doubt whether it is so im-

portant as the rainfall. In no country where the growing season is at all warm can a rainfall of ten or fifteen inches support anything except a xerophilous type of vegetation. In a country so warm as Yucatan thirty or forty inches is by no means a large rainfall, and even if none of it were lost in the karst the country would still be relatively dry because of the great evaporation and long dry season from November or December to May. In the southern half of Yucatan not only on the edges but actually within the limits of the genuine forest, karst phenomena seem to be as marked as near

FIG. 5—A house in a Yucatan village.

the northern coast, but this does not prevent the growth of the rankest kind of vegetation. It seems, therefore, that while the karsted character of the country plays a part in limiting the growth of vegetation, it is by no means so important as the relatively small amount of precipitation.

The people of Yucatan consist of every gradation from pure Indians to pure Spaniards. The forests and the remoter villages are occupied by Indians of the Maya stock; the small towns and the less remote villages are peopled by a mixed race of Mestizoes in

which the Indian element predominates, while in the larger towns and their environs the proportion of Spanish blood steadily rises. The degree of energy and initiative is almost directly in proportion to the amount of Spanish blood. The pure Indian is a quiet, slow being, inoffensive and retiring unless abused. He never seems to work unless compelled. As for storing up anything for the future, the thought seems never to enter his head. If he has enough to eat, he simply sits still and enjoys life until hunger again arouses him to activity. His wants are few and easily supplied. His agriculture

FIG. 6—An Indian seated beside the sleeping platform at his cornfield. Pumpkins on the right and corn cobs on the left.

begins by cutting the smaller trees of the jungle, girdling the few larger ones, leaving the brush to dry during the season of little rain, and finally burning it off. Then, with a pointed stick he makes holes into which he drops corn, beans, and the seeds of the pumpkin, or of one or two other vegetables. The corn is his chief reliance. When the crop is ripe, he never thinks of gathering it all at once, or of storing it away safely, perhaps in the form of flour. His method is to go out to the field in the early part of the dry season after the corn is well ripe, and bend down each stalk so that the ears point

downward and shed the occasional rains. Of course he uses what corn he needs day by day, and his wife grinds a little each morning for the day's tortillas, but beyond this he attempts little. Week by week he picks what ears he needs, caring nothing that insects, birds and beasts are eating what they need also. He knows that a quarter or a third of the ears may be spoiled, but so long as some are left, he cares little. The only thing that ultimately stirs him up to gather the remainder of the crop is the end of the dry season. Before the rains come he knows that he must burn over his field and plant more seed or else he will starve. Therefore he arouses himself for a period of effort at least once during the year. He is hardly to be blamed for his apparent laziness. He certainly is lazy according to our standards, but he has little to stimulate him, and it is easy to get a living without much work. In good qualities, however, he is by no means lacking. He is extremely courteous, and according to all accounts he excels in both honesty and morality.

As the amount of Spanish blood in the people of Yucatan increases, their energy and resourcefulness also increase. They also become more light-hearted and gay than the silent, sober Indians, but at the same time the degree of honesty and morality is said to decrease markedly. All classes of people are slow compared to Americans. During two weeks in Yucatan the only persons whom I remember to have seen running were Mr. E. H. Thompson, for many years United States Consul, and myself. Landing in New York, without having seen any other country in the interim, I confess to having felt almost bewildered by the rush. It was between five and six o'clock in the evening, and by comparison with Yucatan it seemed as if at that hour when people were hastening homeward, about one in ten actually ran. Even though I had been away but seven weeks I had to make a distinct effort to keep up with the crowd, although in Yucatan I had walked faster than almost anyone else. In this connection a fact as to the Spaniards is worth recording. In Yucatan, as well as in other parts of Mexico there is a surprisingly large number of recent Spanish immigrants. According to the almost universal testimony of the numerous people with whom I talked, these immigrants are better workers than the corresponding class of natives, no matter whether the natives are Indians, Mestizoes, or Spaniards who have been in the country a generation or two. Something in the new environment seems to make people slow. In part, this may be due to contact with an inferior race, but more probably it is a matter of climate. Possibly the heat has something

to do with it, but there seems ground for believing that it is the uniformity of the temperature quite as much as its degree. Almost everyone agrees that the natives work hardest on "fresh" days, which may be either because the temperature is lower, or because there has has been a sudden change. When I asked Mr. Thompson about the matter he gave the same testimony as others. Then he went out and asked some of his old Indian friends about it. They agreed with the others, but added, "People work hardest the morning after a norther, after the wind has ceased, and while it is cool. On such days the women bake the tortillas much more quickly than usual, and we get away to work early." The men have to wait each morning until the women grind some flour and bake the universal thin cakes of corn meal known as tortillas. Hence the husbands are apt to take special notice of the days when the tortillas are ready early. Perhaps if Yucatan had a norther every three days instead of only at rare intervals the tortillas might even be baked the evening before.

The human inhabitants of Yucatan are distributed very unequally. Practically all of the 400,000 people of the peninsula live in the jungle region of Yucatan proper and the coastal strip north of Campeche, an area smaller than that of Massachusetts. The rest of the country, comprising most of the province of Campeche and the Federal District known as Quintana Roo, contains only a few wild Indians estimated at 4,000 or 5,000 in number. The reason is not far to seek; the tropical forest has hitherto proved unconquerable. I want to emphasize this matter a little, for it seems to be more important than is generally realized. Descriptions of tropical forests are usually couched in such indefinite terms that it is hard to tell whether a given area in its pristine condition would be covered with jungle or forest. So far as I can ascertain, however, practically all of the tropical regions where the natives have risen to such a state of relative civilization that they live permanently in good-sized villages and depend primarily upon agriculture for a living are located where the prevalent natural growth is of the type which we have defined as jungle. In such a region it is possible for people possessed of even the moderate efficiency of the tropics to get a living by agriculture. The small trees or bushes with a diameter of five inches or less may readily be hacked down with almost any kind of heavy knife; while the occasional larger ones may be girdled by cutting off the bark near the base, and will soon die. If this is done during the earlier part of the dry season, which is characteristic of all tropical regions where jungle prevails, the bushes and perhaps

some of the girdled trees will be dry enough to burn before the rains come again. Hence it is a comparatively simple matter to clear a tract and plant it; moreover, if some of the few larger trees remain standing no harm is done.

In the true forest the case is quite different. In the first place the trees are large, the majority having trunks at least a foot in diameter and many of them much more. Moreover, they are chiefly species whose wood is hard. Hence it is difficult to cut them down. Only persons of great energy are capable of doing much of it. If

FIG. 7—A well in an Indian village.

the easier process of girdling is employed, the trees will die in course of time, and it would seem as though even the inefficient people of the tropics might thus clear large areas. Unfortunately another difficulty arises, which is serious where the trees are actually cut, and more so where they are girdled. The climate of the true tropical forests is so uniformly moist that even when trees have been felled, it takes a long time for them to become dry enough to burn. While they are drying, however, new vegetation begins to sprout, and by the time the trees are ready to burn the new growth is so

large that it prevents the fire from spreading from tree to tree. That this is so is evident from the fact that even in the jungle region the fires which are lighted every year in the spring to burn off the corn stalks appear practically never to spread any great distance into the uncut jungle. The rapid growth of plants in the tropics is far greater than we commonly realize. One day as I was riding on the southern edge of the jungle, near the forest but well out of it, my guide remarked that the land over which we were passing had been cultivated three years before. Already the bushes were fifteen feet

FIG. 8—A "volon" or carriage suspended on straps at a sugar estate in Yucatan. The roads are so rocky that carriages with ordinary springs cannot be used.

high. In the heart of the forest the growth is even faster. Hence the very rankness of the growth of plants is one of the primary reasons why man has never yet really mastered any considerable area where genuine tropical forests prevail.

Other reasons for this also exist. For example, in the forest it is well known that malarial fevers are much worse than in the drier jungle. The natives are said to be immune to such fevers, but modern research throws doubt on this. The adults are immune, but

how about the children? The researches of Sir Ronald Ross and of the Tropical School of Medicine at Liverpool have shown that in Greece, for instance, adults do not suffer much from malaria, but that at least half of the children have it badly during childhood and a large number bear its marks through life in the form of enlarged spleens and other injurious alterations of the organs. Every generation is apparently distinctly weakened by the diseases through which it passes in childhood. Similarly, in places such as Merida, where yellow fever is endemic, it is said that the natives never suffer, and that epidemics break out only when newcomers arrive from outside. Many physicians now think, however, that many of the children have the fever in infancy. Those who die are supposed to have suffered from other infant complaints, while those who recover are of course immune. In the case of yellow fever the after effects are generally not serious, but in the case of malarial fevers, especially the worse forms such as prevail in the tropics, the debilitating results often last through life. Thus it may be that the severe fevers of the forests, attacking the children and killing many of them, leave the remainder permanently weakened and incapacitated for the work of forwarding civilization in their hard surroundings.

So far as the indirect effects of climate upon human character are concerned there seems to be a curious contradiction between tropical and non-tropical regions. In the one case a relative lack of rain seems to be beneficial, while in the other it is in general detrimental. At least we seem to be safe in saying that the most progressive parts of the tropics are comparatively dry, while the most progressive countries of the temperate zone are usually in regions of comparative moisture. Aridity in the tropics is more favorable than moisture partly because the period for which man must make provision in order to tide over the months when no wild food can be obtained is much longer than in the moister regions. Where rain is sufficiently abundant, tropical fruits of some kind ripen at almost all seasons, and wild animals exist in great profusion. In the drier regions, that is where jungle prevails, fruits and seeds ripen chiefly at particular seasons determined by the advent of the rainy season. Moreover, the number of wild animals and birds is less than in the forests, and thus the supply of food is relatively deficient. This seems to force the man who would live, or who is obliged to live in the jungle to make provision for his needs beforehand, a necessity which must be of great value in developing him mentally. Or rather the portion of the community which is not brainy enough to make provision for the

future is in danger of starving, and is gradually eliminated by the weakness and disease arising from its own improvidence. To be sure, the mental stimulus and selection due to relatively arid conditions in the tropics is very small compared with that arising from climatic conditions farther north, but nevertheless it is important.

One evidence of relatively high civilization in Yucatan is the cleanliness of the inhabitants. Not only is Merida, with its beautifully asphalted streets, one of the cleanest cities in the world, but the people themselves are extraordinarily clean. They are more completely and universally clothed than most tropical peoples, and their clothes, which are almost universally white, are kept immaculate by daily washing. The common custom is to take a bath and put on clean clothes at the end of the day's work, and then to wear the clean clothes the next day. Even the poor little newsboys come out each morning in undershirts and drawers which may be ragged but are always freshly washed. The dress of the ordinary men is no more than that of the boys, save that a sort of apron, like a towel, striped in pale blue, is wound around the waist and falls to the knees. The upper classes wear European dress, but white clothes greatly predominate, and are always clean. So common is cleanliness that one of the chief sources of matrimonial difficulties is said to be the failure of the wife to have the tepid water ready for her husband's bath on his return from work.

In the matter of cleanliness two other nations may be put in the same class with the Yucatecos, although it is doubtful whether they rival them. These are the Malays and the Japanese. In certain other countries, such as Cuba and the Philippines, the houses and streets may be dirty, but there is a high degree of personal cleanliness. So, too, in India the upper classes, the Brahmins and others, are notable for the amount of washing that they do. Outside of the tropics it is doubtful whether any nation is so generally clean in person as are those that have just been mentioned. The English boast of their cold tubs, but these are the luxury of the rich, not the everyday necessity of the poor. A crowd of English laborers under ordinary circumstances would seem to the Yucatecos very dirty and odoriferous. The reason for the cleanliness of these people seems to be their climate. They and the other races who are noted for their proneness to bathe live in regions where the atmosphere is practically always warm and where the rains fall heavily during the summer season, making the air extremely humid. If a nation begins to rise in the scale of civilization and adopts the practice of

wearing clothes all the time, it is essential that the custom of bathing become common. The savages who go naked never need a bath, but the civilized people who wear clothes must wash both themselves and their clothes or else the perspiration which cannot evaporate into the moist air will soon render their skins and their clothing unendurably foul. Not only will they become obnoxious to themselves and to others, but they will be liable, apparently, to disease. Thus it would appear that the part of a community which dwells in a hot, damp climate and attempts to wear clothing but does not bathe will

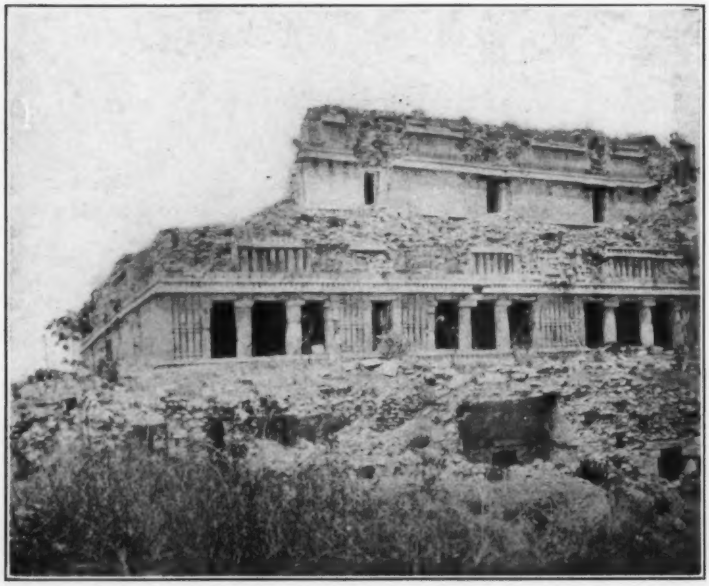

FIG. 9—Ruins of the temple of Sayi.

gradually tend to be eliminated by disease. Those who remain will have thoroughly learned the habit of cleanliness. The extreme excellence of the Yucatecos in this respect may be due to the fact that the Maya Indians have lived so long, for unknown milleniums perhaps, in the same environment. The newcomers who have invaded the country from Europe have followed the example of the natives in part, but "dirty as a Spaniard" is still a common saying. How far cleanliness is associated with other virtues such as strict sexual

morality it is hard to say, but it seems as if there must be some connection.

Among all the problems of Yucatan, as far as the geographer is concerned, perhaps the most interesting is that of the civilization of the past as compared with that of the present. To-day, in spite of the slowness and inefficiency of the inhabitants as compared with European races, the country compares most favorably with other tropical lands. Indeed it is so wealthy that some travelers have supposed Merida to be the richest city in the world in proportion to its

FIG. 10—Detail of the walls of a ruin at Kabah.

size. Whether this be true or not there can be no doubt that the country is rich, and that signs of poverty are hard to find. Possibly this apparent prosperity is partly due to the excessive neatness of the people, for neatness is in most countries the luxury of the well-to-do. Perhaps, too, their neatness in itself is a help against poverty. However that may be, there is at the present time a distinct and special reason why Yucatan has an extraordinarily prosperous air, and impresses the casual traveler as quite different from most tropical countries. This reason is the henequen or sisal fiber

industry. Henequen, as is well known, is a species of yucca which grows well in the relatively dry portions of Yucatan. The fiber is the strongest and most durable known, its only rival being Manilla hemp. The growth of the demand for strong fibers, occasioned especially by the expansion of the grain fields in America and elsewhere, has for many years tended to increase the value of henequen, and has led to the planting of many square miles of the yucca in long, montonous rows extending across the hillocky plain between uncompromisingly angular stone walls. This, too, has led to the

FIG. 11—The henequen or sisal plant.

building of a large number of narrow-gauge railroads in the dry northern part of Yucatan, and to the construction of hundreds of miles of diminutive tram lines leading off from the railroad stations to the larger henequen "fincas." At the time of the Spanish War in 1898 the supply of Manila hemp was cut off for a few years and the price of henequen began to soar. Now it has fallen a good deal, but the fiber is still a highly valuable export and makes the country much more prosperous than it could be without the aid of some such highly specialized product. The whole aspect of the country shows

this, for it is the cause not only of the abundant railroads and tram lines, the almost imposing houses at some of the estates, and the fine dwellings of Merida, but also of the excellent public buildings and finely paved streets which make such an impression upon the traveler when he first arrives.

The prosperity of to-day is apparently but a slight incident compared with that of the past. The present prosperity is in danger of proving ephemeral. It will vanish if another equally good fiber should be discovered in places where it can be raised more cheaply than in Yucatan. Even if it should last, it is an extraneous matter. It is due to the demands of the United States and other countries, it is fostered by their steamship lines, and its benefits are chiefly reaped not by the Indians and Mestizoes, but by people of Spanish blood, many of whom have not been in the country more than a generation or two. In the past, on the contrary, Yucatan had a high and long-enduring civilization which arose indigenously. I know that many people think that the seeds of Yucatecan culture in the hoary past were derived from Egypt or China or some other part of the Old World. I make no attempt to controvert this view, although I think that it is far from proven. This much, however, will be admitted by all: the connection between the Old World and the New, if any ever existed, was brief and one might say almost accidental. There was quite surely no such thing as any prolonged intercourse whereby for centuries ideas and methods of thought and action were transferred across the water. Moreover, the wonderful ruins of Yucatan, those great temples which arouse one's admiration just as do the monuments of Egypt, are distinctly Yucatecan in style. Whatever may have been imported from other parts of the world had remained long in Yucatan and had been remodelled to fit the genius of the old American race before it became fixed in the great structures which now excite our wonder. Yucatecan ideas in art, Yucatecan methods of supplying water in a land where there is none on the surface, and Yucatecan peculiarities of religion and taste had become strongly developed. Therefore we must conclude that even if some race from abroad did originally come to the land,—which many of the best authorities deny,—they did not stagnate and deteriorate as seems to be the case with modern immigrants after a generation or two. They did not imbibe the tropical languor which ultimately seems to check progress unless there is a continual stimulus from without. They kept on working, and developing new ideas. They had the industry to make some of the world's finest ruins, fashioned of care-

fully hewn stones and ornamented with wonderful carvings. And they did it all without the aid of iron. To develop so far must have required centuries, and so we may safely say that Yucatan once stimulated its people to an activity of mind and body comparable to that of any part of the world. Were the people capable of stimulation because of something in the fiber of the original race, or was the stimulus due to something in their environment?

AMUNDSEN'S EXPEDITION TO THE SOUTH POLE*

The plan of the third *Fram* expedition was twofold: first, the attainment of the South Pole and, second, the exploration of the North Polar regions. This evening I have the honor to report to you on the accomplishment of the first part of this plan.

I can only mention briefly here the expeditions which have worked in the region which we had selected for our starting point. As we wished to reach the South Pole our first problem was to go south as far as possible with our ship and there establish our station. Even so, the sled journeys would be long enough. I knew that the English expedition would again choose their old winter quarters in McMurdo Sound, South Victoria Land, as their starting point. From newspaper report it was known that the Japanese had selected King Edward VII Land. In order to avoid these two expeditions we had to establish our station on the Great Ice Barrier as far as possible from the starting points of the two other expeditions.

The Great Ice Barrier, also called the Ross Barrier, lies between South Victoria Land and King Edward VII Land and has an extent of about 515 miles† The first to reach this mighty ice formation was Sir James Clark Ross in 1841. He did not dare approach the great ice wall, 100 feet high, with his two sailing ships, the *Erebus* and the *Terror,* whose progress southward was impeded by this mighty obstacle. He examined the ice wall from a distance, however, as far as possible. His observations showed that the Barrier is not a continuous, abrupt ice wall, but is interrupted by bays and

*Lecture delivered in German by Roald Amundsen before the Berlin Geographical Society on Oct. 9, 1912. Translated and reprinted from the *Zeitschr. der Gesell. für Erdkunde zu Berlin*, 1912, No. 7, pp. 481–498.

† All values have been changed from the metric system to English equivalents.

small channels. On Ross's map a bay of considerable magnitude may be seen.

The next expedition was that of the *Southern Cross* in 1900. It is interesting to note that this party found the bay mentioned above at the same place where Ross had seen it in 1841, nearly sixty years before; that this expedition also was able to land a few miles to the east of the large bay in a small bay, named Balloon Bight, and from there to ascend the Ice Barrier, which heretofore had been considered an insurmountable obstacle to further advance towards the south.

In 1901 the *Discovery* steamed along the Barrier and confirmed in every respect what the *Southern Cross* had observed. Land was also discovered in the direction indicated by Ross, namely King Edward VII Land. Scott, too, landed in Balloon Bight, and, like his predecessors, saw the large bay to the west.

In 1908 Shackleton arrived there on the *Nimrod*. He, too, followed along the edge of the Ice Barrier. He came to the conclusion that disturbances had taken place in the Ice Barrier. The shore line of Balloon Bight, he thought, had changed and merged with the large bay to the west. This large bay, which he thought to be of recent origin, he named Bay of Whales. He gave up his original plan of landing there, as the Ice Barrier appeared to him too dangerous for the establishment of winter quarters.

It was not difficult to determine that the bay shown on Ross's map and the so-called Bay of Whales are identical; it was only necessary to compare the two maps. Except for a few pieces that had broken off from the Barrier, the bay had remained the same for the last seventy years. It was therefore possible to assume that the bay did not owe its origin to chance and that it must be underlain by land, either in the form of sand banks or otherwise.

This bay we decided upon as our base of operations. It lies 400 miles from the English station in McMurdo Sound and 115 miles from King Edward VII Land. We could therefore assume that we should be far enough from the English sphere of interest and need not fear crossing the route of the English expedition. The reports concerning the Japanese station on King Edward VII Land were indefinite: we took it for granted, however, that a distance of 115 miles would suffice.

On August 9, 1910, we left Norway on the *Fram*, the ship that had originally been built for Nansen. We had ninety-seven superb Eskimo dogs and provisions for two years. The first harbor we

reached was Madeira. There the last preparations were made for our voyage to the Ross Barrier—truly not an insignificant distance which we had to cover, namely, 16,000 nautical miles from Norway to the Bay of Whales. We had estimated that this trip would require five months. The *Fram,* which has justly been called the staunchest polar ship in the world, on this voyage across practically all of the oceans, proved herself to be extremely seaworthy. Thus we traversed without a single mishap the regions of the northeast and of the southeast trades, the stormy seas of the "roaring forties," the fogs of the fifties, the ice-filled sixties and reached our field of work at the Ice Barrier on Jan. 14, 1911. Everything had gone splendidly.

The ice in the Bay of Whales had just broken up, and we were able to advance considerably farther south than any of our predecessors had done. We found a quiet little nook behind a projecting ice cape; from here we could transfer our equipment to the Barrier with comparative safety. Another great advantage was that the Barrier at this place descended very gradually to the sea ice, so that we had the best possible surface for our sleds. Our first undertaking was to ascend the Barrier in order to get a general survey and to determine a suitable place for the erection of the house which we had brought with us. The supposition that this part of the Barrier rests on land seemed to be confirmed immediately by our surroundings. Instead of the smooth, flat surface which the outer wall of the Barrier presents, we here found the surface to be very uneven. We everywhere saw sharp hills and points between which there were pressure-cracks and depressions filled with large masses of drift. These features were not of recent date. On the contrary, it was easy to see that they were very old and that they must have had their origin at a time which long preceded the period of Ross's visit.

Originally we had planned to establish our station several miles from the edge of the Barrier, in order not to subject ourselves to the danger of an unwelcome and involuntary sea trip, which might have occurred had the part of the Barrier on which we erected our house broken off. This precaution, however, was not necessary, as the features which we observed on our first examination of the area offered a sufficient guarantee for the stability of the Barrier at this point.

In a small valley, hardly two and a half miles from the ship's anchorage, we therefore selected a place for our winter quarters. It was protected from the wind on all sides. On the next day we began unloading the ship. We had brought with us material for house

building as well as equipment and provisions for nine men for several years. We divided into two groups, the ship's group and the land group. The first was composed of the commander of the ship, Captain Nilsen, and the nine men who were to stay on board to take the *Fram* out of the ice and to Buenos Aires. The other group consisted of the men who were to occupy the winter quarters and march on to the south. The ship's group had to unload everything from the ship upon the ice. There the land group took charge of the cargo and brought it to the building site. At first we were rather unaccustomed to work, as we had had little exercise on the long sea voyage. But before long we were all "broken in," and then the transfer to the site of our home "Framheim" went on rapidly; the house grew daily.

When all the material had been landed our skilled carpenters, Olav Bjaaland and Jörgen Stubberud, began building the house. It was a ready-made house which we had brought with us; nothing had to be done but to put together the various numbered parts. In order that the house might brave all storms, its bottom rested in an excavation four feet beneath the surface. On Jan. 28, fourteen days after our arrival, the house was completed, and all provisions had been landed. A gigantic task had been performed; everything seemed to point towards a propitious future. But no time was to be lost; we had to make use of every minute.

The land group had in the meantime been divided into two parties, one of which saw to it that the provisions and equipment still lacking were taken out of the ship. The other party was to prepare for an excursion towards the south which had in view the exploration of the immediate environs and the establishment of a depot.

On Feb. 10 the latter group marched south. There were four of us with eighteen dogs and three sleds packed with provisions. That morning of our start is still vividly in my memory. The weather was calm, the sky hardly overcast. Before us lay the large, unlimited snow plain, behind us the Bay of Whales with its projecting ice capes and at its entrance our dear ship, the *Fram*. On board the flag was hoisted; it was the last greeting from our comrades of the ship. No one knew whether and when we should see each other again. In all probability our comrades would no longer be there when we returned; a year would probably elapse before we could meet again. One more glance backwards, one more parting greeting and then—forward.

Our first advance on the Barrier was full of excitement and sus-

pense. So many questions presented themselves: What will be the nature of the region we have to cross? How will the sleds behave? Will our equipment meet the requirements of the situation? Have we the proper hauling power? If we were to accomplish our object, everything had to be of the best. Our equipment was substantially different from that of our English competitors. We placed our whole trust on Eskimo dogs and skis, while the English, as a result of their own experience, had abandoned dogs as well as skis, but, on the other hand, were well equipped with motor sleds and ponies.

We advanced rapidly on the smooth, white snow plain. On Feb. 14 we reached 80° S. We had thus covered 99 miles. We established a depot here mainly of 1,300 pounds of provisions which we intended to use on our main advance to the south in the spring. The return journey occupied two days; on the first we covered forty miles and on the second fifty-seven miles. When we reached our station the *Fram* had already left. The bay was lonely and deserted; only seals and penguins were in possession of the place.

This first excursion to the south, although brief, was of great importance to us. We now knew definitely that our equipment and our pulling power were eminently suited to the demands upon them. In their selection no mistake had been made. It was now for us to make use of everything to the best advantage.

Our sojourn at the station was only a short one. On Feb. 22 we were ready again to carry supplies to a more southern depot. We intended to push this depot as far south as possible. On this occasion our expedition consisted of eight men, seven sleds, and forty-two dogs. Only the cook remained at "Framheim."

On Feb. 27 we passed the depot which we had established at 80° S.; we found everything in the best of order. On March 4 we reached the eighty-first parallel and deposited there 1,150 pounds of provisions. Three men returned from here to the station while the five others continued toward the south and reached the eighty-second parallel on March 8, depositing there 1,375 pounds of provisions. We then returned, and on March 22 were again at home. Before the winter began we made another excursion to the depot in 80° S., and added to our supplies there 2,400 pounds of fresh salt meat and 440 pounds of other provisions. On April 11 we returned from this excursion; this ended all of our work connected with the establishment of depots. Up to that date we had carried out 6,700 pounds of provisions and had distributed these in three repositories.

The part of the Barrier over which we had gone heretofore has

an average height of 165 feet and looked like a flat plain which continued with slight undulations without any marked features that could have served for orientation. It has heretofore been the opinion that on such an endless plain no provisions can be cached without risking their loss. If we were, however, to have the slightest chance of reaching our goal we had to establish depots, and that to as great an extent as possible. This question was discussed among us, and we decided to establish signs across our route, and not along it, as has been generally done heretofore. We therefore set up a row of signs at right angles to our route, that is in an east-west direction from our depots. Two of these signs were placed on opposite sides of each of the three depots, at a distance of 5.6 miles (9 kilometers) from them; and between the signs and the depot two flags were erected for every kilometer. In addition, all flags were marked so that we might know the direction and distance of the depot to which it referred. This provision proved entirely trustworthy; we were able to find our depots even in dense fog. Our compasses and pedometers were tested at the station; we knew that we could rely upon them.

By our excursions to the depots we had gained a great deal. We had not only carried a large amount of provisions towards the south, but we had also gained valuable experience. That was worth more and was to be of value to us on our final advance to the pole.

The lowest temperature we had observed on these depot excursions was —50° Centigrade. The fact that it was still summer when we recorded this temperature warned us to see that our equipment was in good condition. We also realized that our heavy sleds were too unwieldly and that they could easily be made much lighter. This criticism was equally applicable to the greater part of our equipment.

Several days before the disappearance of the sun were devoted to hunting seal. The total weight of the seals killed amounted to 132,000 pounds. We therefore had ample provisions for ourselves as well as for our 115 dogs.

Our next problem was to supply a protective roof for our dogs. We had brought with us ten large tents in which sixteen men could easily find room. They were set up on the Ice Barrier; the snow was then dug out to a depth of six and a half feet inside the tents, so that each dog hut was nearly twenty feet high. The diameter of a dog hut on the ground was sixteen feet. We made these huts spacious so that they might be as airy as possible and thus avert the frost which is so injurious to dogs. Our purpose was entirely attained, for even in the severest weather no dogs were frozen. The

tents were always warm and comfortable. Twelve dogs were housed in each, and every man had to take care of his own pack.

After we had seen to the wants of the dogs we could then think of ourselves. As early as April the house was entirely covered by snow. In this newly drifted snow, passageways were dug connecting directly with the dog huts. Ample room was thus at our disposal without the need on our part of furnishing building material. We had workshops, a blacksmith shop, a room for sewing, one for packing, a storage room for coal, wood and oil, a room for regular baths and one for steam baths. The winter might be as cold and stormy as it would; it could do us no harm.

On April 21 the sun disappeared and the longest night began which had ever been experienced by man in the Antarctic. We did not need to fear the long night for we were well equipped with provisions for years and had a comfortable, well-ventilated, well-situated and protected house. In addition we had our splendid bathroom where we could take a bath every week. It really was a veritable sanatorium.

After these arrangements had been completed we began preparations for the main advance in the following spring. We had to improve our equipment and make it lighter. We discarded all our sleds, for they were too heavy and unwieldy for the smooth surface of the Ice Barrier. Our sleds weighed 165 pounds each. Bjaaland, our ski and sled maker, took the sleds in hand, and when spring arrived he had entirely made over our sledge equipment. These sleds weighed only one-third as much as the old ones. In the same way it was possible to reduce the weight of all other items of our equipment. Packing the provisions for the sledge journey was of the greatest importance. Capt. Johansen attended to this work during the winter. Each of the 42,000 loaves of hard bread had to be handled separately before it could be assigned to its proper place. In this way the winter passed quickly and agreeably. All of us were occupied all the time. Our house was warm, dry, light and airy, and we all enjoyed the best of health. We had no physician and needed none.

Meteorological observations were taken continuously. The results were surprising. We had thought that we should have disagreeable, stormy weather, but this was not the case. During the whole year of our sojourn at the station we experienced only two moderate storms. The rest of the time light breezes prevailed, mainly from an easterly direction. Atmospheric pressure was as a rule very low, but

remained constant. The temperature sank considerably, and I deem it probable that the mean annual temperature which we recorded, —26°Centigrade, is the lowest mean temperature which has ever been observed. During five months of the year we recorded temperatures below —50° Centigrade. On Aug. 23 the lowest temperature was recorded, —59°. The *aurora australis,* corresponding to the northern lights of the Arctic, was observed frequently and in all directions and forms. This phenomenon changed very rapidly, but, except in certain cases, was not very intensive.

On Aug. 24 the sun reappeared. The winter had ended. Several days earlier we had put everything in the best of order, and when the sun rose over the Barrier we were ready to start. The dogs were in fine condition.

From now on we observed the temperature daily with great interest, for as long as the mercury remained below —50° a start was not to be thought of. In the first days of September all signs indicated that the mercury would rise. We therefore resolved to start as soon as possible. On Sept. 8 the temperature was —30°. We started immediately, but this march was to be short. On the next day the temperature began to sink rapidly, and several days later the thermometer registered —55° Centigrade. We human beings could probably have kept on the march for some time under such a temperature, for we were protected against the cold by our clothing; but the dogs could not have long withstood this degree of cold. We were therefore glad when we reached the eightieth parallel. We deposited there our provisions and equipment in the depot which we had previously erected and returned to "Framheim."

The weather now became very changeable for a time—the transitional period from winter to summer; we never knew what weather the next day would bring. Frostbites from our last march forced us to wait until we definitely knew that spring had really come. On Sept. 24 we saw at last positive evidence that spring had arrived: the seals began to clamber up on the ice. This sign was hailed with rejoicing—not a whit less the seal meat which Bjaaland brought on the same day. The dogs, too, enjoyed the arrival of spring. They were ravenous for fresh seal meat. On Sept. 29 another unrefutable sign of spring appeared in the arrival of a flock of Antarctic petrels. They flew around our house inquisitively to the joy of all, not only of ourselves, but also of the dogs. The latter were wild with joy and excitement, and ran after the birds in hopes of getting a delicate morsel. Foolish dogs! Their chase ended with a wild fight among themselves.

On Oct. 20 the weather had at last become so stable that we could start. We had, meanwhile, changed our original plan, which was that we should all advance southward together. We realized that we could travel with perfect safety in two groups and thus accomplish much more. We arranged that three men should go to the east to explore King Edward VII Land; the remaining five men were to carry out the main plan, the advance on the South Pole.

October 20 was a beautiful day. Clear, mild weather prevailed. The temperature was 1° Centigrade above zero. Our sleds were light, and we could advance rapidly. We did not need to hurry our dogs for they were eager enough themselves. We numbered five men and fifty-two dogs with four sleds. Together with the provisions which we had left in the three depots at the eightieth, the eighty-first and the eighty-second parallels we had sufficient sustenance for 120 days.

Two days after our departure we nearly met with a serious accident. Bjaaland's sled fell into one of the numerous crevasses. At the critical moment we were fortunately able to come to Bjaaland's aid; had we been a moment later the sled with its thirteen dogs would have disappeared in the seemingly bottomless pit.

On the fourth day we reached our depot at 80° S. We remained there two days and gave our dogs as much seal meat as they would eat.

Between the eightieth and the eighty-first parallel the Barrier ice along our route was even, with the exception of a few low undulations; dangerous hidden places were not to be found. The region between the eighty-first and the eighty-second parallel was of a totally different character. During the first nineteen miles we were in a veritable labyrinth of crevasses, very dangerous to cross. At many places yawning abysses were visible because large pieces of the surface had broken off; the surface therefore presented a very unsafe appearance. We crossed this region four times in all. On the three first times such a dense fog prevailed that we could only recognize objects a few feet away. Only on the fourth occasion did we have clear weather. Then we were able to see the great difficulties to which we had been exposed.

On Nov. 5 we reached the depot at the eighty-second parallel and found everything in order. For the last time our dogs were able to have a good rest and eat their fill; and they did so thoroughly during their two days' rest.

Beginning at the eightieth parallel we constructed snow cairns

which should serve as sign-posts on our return. In all we erected 150 such sign-posts, each of which required sixty snow blocks. About 9,000 snow blocks had therefore to be cut out for this purpose. These cairns did not disappoint us, for they enabled us to return by exactly the same route we had previously followed.

South of the eighty-second parallel the Barrier was, if possible, still more even than farther north; we therefore advanced quite rapidly. At every unit parallel which we crossed on our advance towards the south we established a depot. We thereby doubtlessly exposed ourselves to a certain risk, for there was no time to set up sign-posts around the depots. We therefore had to rely on snow cairns. On the other hand, our sleds became lighter, so that it was never hard for the dogs to pull them.

When we reached the eighty-third parallel we saw land in a southwesterly direction. This could only be South Victoria Land, probably a continuation of the mountain range which runs in a southeasterly direction and which is shown on Shackleton's map. From now on the landscape changed more and more from day to day: one mountain after another loomed up, one always higher than the other. Their average elevation was 10,000 to 16,000 feet. Their crest-line was always sharp; the peaks were like needles. I have never seen a more beautiful, wild and imposing landscape. Here a peak would appear with somber and cold outlines, its head buried in the clouds; there one could see snow fields and glaciers thrown together in hopeless confusion. On Nov. 11 we saw land to the south and could soon determine that a mountain range, whose position is about 86° S. and 163° W., crosses South Victoria Land in an easterly and northeasterly direction. This mountain range is materially lower than the mighty mountains of the rest of South Victoria Land. Peaks of an elevation of 1,800 to 4,000 feet were the highest. We could see this mountain chain as far as the eighty-fourth parallel, where it disappeared below the horizon.

On Nov. 17 we reached the place where the Ice Barrier ends and the land begins. We had proceeded directly south from our winter quarters to this point. We were now in 85° 7′ S. and 165° W. The place where we left the Barrier for the land offered no special difficulties. A few extended undulating reaches of ice had to be crossed which were interrupted by crevasses here and there. Nothing could impede our advance. It was our plan to go due south from "Framheim" and not to deviate from this direction unless we should be forced to by obstacles which nature might place in our path. If

our plan succeeded it would be our privilege to explore completely unknown regions and thereby to accomplish valuable geographic work.

The immediate ascent due south into the mountainous region led us between the high peaks of South Victoria Land. To all intents and purposes no great difficulties awaited us here. To be sure, we should probably have found a less steep ascent if we had gone over to the newly discovered mountain range just mentioned. But as we maintained the principle that direct advance due south was the shortest way to our goal, we had to bear the consequences.

At this place we established our principal depot and left provisions for thirty days. On our four sleds we took provisions with us for sixty days. And now we began the ascent to the plateau. The first part of the way led us over snow-covered mountain slopes, which at times were quite steep, but not so much so as to prevent any of us from hauling up his own sled. Farther up, we found several glaciers which were not very broad but were very steep. Indeed, they were so steep that we had to harness twenty dogs in front of each sled. Later the glaciers became more frequent, and they lay on slopes so steep that it was very hard to ascend them on our skis. On the first night we camped at a spot which lay 2,100 feet above sea level. On the second day we continued to climb up the mountains, mainly over several small glaciers. Our next camp for the night was at an altitude of 4,100 feet above the sea.

On the third day we made the disagreeable discovery that we should have to descend 2,100 feet, as between us and the higher mountains to the south lay a great glacier which crossed our path from east to west. This could not be helped. The expedition therefore descended with the greatest possible speed and in an incredibly short time we were down on the glacier, which was named Axel Heiberg Glacier. Our camp of this night lay at about 3,100 feet above sea level. On the following day the longest ascent began; we were forced to follow Axel Heiberg Glacier. At several places ice blocks were heaped up so that its surface was hummocky and cleft by crevasses. We had therefore to make detours to avoid the wide crevasses which, below, expanded into large basins. These latter, to be sure, were filled with snow; the glacier had evidently long ago ceased to move. The greatest care was necessary in our advance, for we had no inkling as to how thick or how thin the cover of snow might be. Our camp for this night was pitched in an extremely picturesque situation at an elevation of about 5,250 feet above sea level. The glacier

was here hemmed in by two mountains which were named "Fridtjof Nansen" and "Don Pedro Christophersen," both 16,000 feet high.

Farther down towards the west at the end of the glacier "Ole Engelstad Mountain" rises to an elevation of about 13,000 feet. At this relatively narrow place the glacier was very hummocky and rent by many deep crevasses, so that we often feared that we could not advance farther. On the following day we reached a slightly inclined plateau which we assumed to be the same which Shackleton describes. Our dogs accomplished a feat on this day which is so remarkable that it should be mentioned here. After having already done heavy work on the preceding days, they covered nineteen miles on this day and overcame a difference in altitude of 5,700 feet. On the following night we camped at a place which lay 10,800 feet above sea level. The time had now come when we were forced to kill some of our dogs. Twenty-four of our faithful comrades had to die. The place where this happened was named the "Slaughter House." On account of bad weather we had to stay here for four days. During this stay both we and the dogs had nothing except dog meat to eat. When we could at last start again on Nov. 26, the meat of ten dogs only remained. This we deposited at our camp; fresh meat would furnish a welcome change on our return. During the following days we had stormy weather and thick snow flurries, so that we could see nothing of the surrounding country. We observed, however, that we were descending rapidly. For a moment, when the weather improved for a short time, we saw high mountains directly to the east. During the heavy snow squall on Nov. 28 we passed two peculiarly shaped mountains lying in a north-south direction; they were the only ones that we could see on our right hand. These "Helland-Hansen Mountains" were entirely covered by snow and had an altitude of 9,200 feet. Later they served as an excellent landmark for us.

On the next day the clouds parted and the sun burst forth. It seemed to us as if we had been transferred to a totally new country. In the direction of our advance rose a large glacier, and to the east of it lay a mountain range running from southeast to northwest. Toward the west, impenetrable fog lay over the glacier and obscured even our immediate surroundings. A measurement by hypsometer gave 8,200 feet for the point lying at the foot of this, the "Devil's Glacier." We had therefore descended 2,600 feet since leaving the "Slaughter House." This was not an agreeable discovery, as we, no doubt, would have to ascend as much again, if not more. We left provisions here for six days and continued our march.

From the camp of that night we had a superb view of the eastern mountain range. Belonging to it we saw a mountain of more wonderful form than I have ever seen before. The altitude of the mountain was 12,300 feet; its peaks roundabout were covered by a glacier. It looked as if Nature, in a fit of anger, had dropped sharp cornered ice blocks on the mountain. This mountain was christened "Helmer-Hansen Mountain," and became our best point of reference. There we saw also the "Oscar Wisting Mountains," the "Olav Bjaaland Mountains," the "Sverre Hassel Mountains," which, dark and red, glittered in the rays of the midnight sun and reflected a white and blue light. In the distance the mountains seen before loomed up romantically; they looked very high when one saw them through the thick clouds and masses of fog which passed over them from time to time and occasionally allowed us to catch glimpses of their mighty peaks and their broken glaciers. For the first time we saw the "Thorvald Nilsen Mountain," which has a height of 16,400 feet.

It took us three days to climb the "Devil's Glacier." On the first of December we had left behind us this glacier with its crevasses and bottomless pits and were now at an elevation of 9,350 feet above sea level. In front of us lay an inclined block-covered ice plateau which, in the fog and snow, had the appearance of a frozen lake. Traveling over this "Devil's Ball Room," as we called the plateau, was not particularly pleasant. Southeasterly storms and snow flurries occurred daily during which we could see absolutely nothing. The floor on which we were walking was hollow beneath us; it sounded as if we were going over empty barrels. We crossed this disagreeable and uncanny region as quickly as was compatible with the great care we had to exercise, for during the whole time we were thinking of the unwelcome possibility of sinking through.

On Dec. 6 we reached our highest point—according to hypsometric measurement 11,024 feet above sea level. From there on the interior plateau remained entirely level and of the same elevation. In 88°23′ S. we had reached the place which corresponded to Shackleton's southernmost advance. We camped in 88°25′ S. and established there our last—the tenth—depot, in which we left 220 pounds of provisions. Our way now gradually led downward. The surface was in excellent condition, entirely level, without a single hill or undulation or other obstacle. Our sleds forged ahead to perfection; the weather was beautiful; we daily covered seventeen miles. Nothing prevented us from increasing our daily distance. But we had time enough and ample provisions; we thought it wiser, also, to spare

our dogs and not to work them harder than necessary. Without a mishap we reached the eighty-ninth parallel on Dec. 11. It seemed as if we had come into a region where good weather constantly prevails. The surest sign of continued calm weather was the absolutely level surface. We could push a tent pole seven feet deep into the snow without meeting with any resistance. This proved clearly enough that the snow had fallen in equable weather; calm must have prevailed or a slight breeze may have blown at the most. Had the weather been variable—calms alternating with storms—snow strata of different density would have formed, a condition which we would immediately have noticed when driving in our tent poles.

Our dead reckoning had heretofore always given the same results as our astronomical observations. During the last eight days of our march we had continuous sunshine. Every day we stopped at noon in order to measure the meridian altitude and every evening we made an observation for azimuth. On Dec. 13 the meridian altitude gave 89°37′, dead reckoning, 89°38′. In latitude 88°25′ we had been able to make our last good observation of azimuth. Subsequently this method of observation became valueless. As these last observations gave practically the same result and the difference was almost a constant one we used the observation made in 88°25′ as a basis. We calculated that we should reach our goal on Dec. 14.

Dec. 14 dawned. It seemed to me as if we slept a shorter time, as if we ate breakfast in greater haste and as if we started earlier on this morning than on the preceding days. As heretofore, we had clear weather, beautiful sunshine and only a very light breeze. We advanced well. Not much was said. I think that each one of us was occupied with his own thoughts. Probably only one thought dominated us all, a thought which caused us to look eagerly towards the south and to scan the horizon of this unlimited plateau. Were we the first, or ———?

The distance calculated was covered. Our goal had been reached. Quietly, in absolute silence, the mighty plateau lay streched out before us. No man had ever yet seen it, no man had ever yet stood on it. In no direction was a sign to be seen. It was indeed a solemn moment when, each of us grasping the flagpole with one hand, we all hoisted the flag of our country on the geographical South Pole, on "King Haakon VII Plateau."

During the night, as our watches showed it to be, three of our men went around the camp in a circle ten geographical miles (11.6 statute miles) in diameter and erected cairns, while the other two

men remained in the tent and made hourly astronomical observations of the sun. These gave 89°55′ S. We might well have been satisfied with this result, but we had time to spare and the weather was fine. Why should we not try to make our observations at the Pole itself? On Dec. 16, therefore, we transported our tent the remaining 5¾ miles to the south and camped there. We arranged everything as comfortably as possible in order to make a round of observations during the twenty-four hours. The altitude was measured every hour by four men with the sextant and artificial horizon. These observations will be worked out at the University of Christiania. This tent camp served as the center of a circle which we drew with a radius of 5 1/6 miles [on the circumference of which] cairns were erected. A small tent which we had brought with us in order to designate the South Pole was put up here and the Norwegian flag with the pennant of the *Fram* was hoisted above it. This Norwegian home received the name of "Polheim." According to the observed weather conditions, this tent may remain there for a long time. In it we left a letter addressed to His Majesty, King Haakon VII, in which we reported what we had done. The next person to come there will take the letter with him and see to its delivery. In addition, we left there several pieces of clothing, a sextant, an artificial horizon, and a hypsometer.

On Dec. 17 we were ready to return. On our journey to the Pole we had covered 863 miles, according to the measurements of the odometer; our mean daily marches were therefore 15 miles. When we left the Pole we had three sleds and seventeen dogs. We now experienced the great satisfaction of being able to increase our daily rations, a measure which previous expeditions had not been able to carry out, as they were all forced to reduce their rations, and that at an early date. For the dogs, too, the rations were increased, and from time to time they received one of their comrades as additional food. The fresh meat revived the dogs and undoubtedly contributed to the good results of the expedition.

One last glance, one last adieu, we sent back to "Polheim." Then we resumed our journey. We still see the flag; it still waves to us. Gradually it diminishes in size and finally entirely disappears from our sight. A last greeting to the Little Norway lying at the South Pole!

We left King Haakon VII Plateau, which lay there bathed in sunshine, as we had found it on our outward journey. The mean temperature during our sojourn there was —13° Centigrade. It seemed, however, as though the weather was much milder.

I shall not tire my esteemed auditors by a detailed description of our return, but shall limit myself to some of the interesting episodes.

The splendid weather with which we were favored on our return displayed to us the panorama of the mighty mountain range which is the continuation of the two ranges which unite in 86° S. The newly discovered range runs in a southeasterly direction and culminates in domes of an elevation of 10,000 to over 16,000 feet. In 88° S. this range disappears in the distance below the horizon. The whole complex of newly discovered mountain ranges, which may extend a distance of over 500 miles, has been named the Queen Maud Ranges.

We found all of our ten provision depots again. The provisions, of which we finally had a superabundance, were taken with us to the eightieth parallel and cached there. From the eighty-sixth parallel on we did not need to apportion our rations; everyone could eat as much as he desired.

After an absence of ninety-nine days we reached our winter quarters, "Framheim," on Jan. 25. We had, therefore, covered the journey of 864 miles in thirty-nine days, during which we did not allow ourselves any days of rest. Our mean daily march, therefore, amounted to 22.1 miles. At the end of our journey two of our sleds were in good condition and eleven dogs healthy and happy. Not once had we needed to help our dogs and to push the sleds ourselves.

Our provisions consisted of pemmican, biscuits, desiccated milk, and chocolate. We therefore did not have very much variety, but it was healthful and robust nourishment which built up the body, and it was of course just this that we needed. The best proof of this was that we felt well during the whole time and never had reason to complain of our food, a condition which has occurred so often on long sledge journeys and must be considered a sure indication of improper nourishment.

During our absence, Lieut. Prestrud with his two companions had done excellent work towards the east and in the vicinity of the Bay of Whales. They succeeded in reaching King Edward VII Land, which Scott had discovered, and in confirming what we had seen. It was found that the Alexandra Mountains are a range entirely snow covered and with an elevation of 1,230 feet. They run in a southeasterly direction as far as the eye can reach and are bounded on the north by mountains 2,000 feet high, which were named "Nutakar" by Scott.

The observations made on this expedition in the neighborhood of

"Framheim" are of great interest. They resulted in determining that the Bay of Whales has a snow-covered bottom.

Simultaneously with our work on land, scientific observations were made on board the *Fram* by Captain Nilsen and his companions which probably stamp this expedition as the most valuable of all. The *Fram* made a voyage from Buenos Aires to the coast of Africa and back, covering a distance of 8,000 nautical miles, during which a series of oceanographical observations was made at no less than sixty stations. The total length of the *Fram's* journey equaled twice the circumnavigation of the globe. The *Fram* has successfully braved dangerous voyages which made high demands upon her crew. The trip out of the ice region in the fall of 1911 was of an especially serious character. Her whole complement then comprised only ten men. Through night and fog, through storm and hurricane, through pack ice and between icebergs the *Fram* had to find her way. One may well say that this was an achievement that can be realized only by experienced and courageous sailors, a deed that honors the whole nation.

In conclusion, you will allow me to say that it was these same ten men, who on Feb. 15, 1911, hoisted the flag of their country, the Norwegian flag, on a more southerly point of the earth than the crew of any other ship whose keel ever cleft the waves.* This is a worthy record in our record century. Farthest north, farthest south did our dear old *Fram* penetrate.

DEVELOPMENT AND STATE OF PROGRESS OF THE UNITED STATES PORTION OF THE INTERNATIONAL MAP OF THE WORLD

BY

W. L. G. JOERG

(Map facing p. 842.)

During the visit of the Transcontinental Excursion of this Society to the United States Geological Survey in Washington on October 14, 1912, the members were given every opportunity to

* The *Fram* penetrated to the head of the Bay of Whales, 78°41′ S. (*New York Times*, March 9, 1912.)

acquaint themselves with the present state of progress of the portion of the International Map of the World being compiled by the Survey. In view of the fact that this information has not been easily accessible in print, the following notes, covering also the history of the development of that portion, together with the accompanying map, in the preparation of both of which the Geological Survey has given generous assistance, may prove of interest.

The first steps taken by the Geological Survey to compile a general map of the United States similar in scope to the International Map antedated by several years the meeting of the International Map Committee in London in November, 1909. As early as 1903 or 1904 the Survey had prepared in manuscript contour maps on the scale of 12 miles to the inch of Colorado, New Mexico, Arizona, Wyoming, Delaware, Maryland, Virginia and West Virginia.* Actuated by Professor Penck's appeal at the Eighth International Geographic Congress in Washington in September, 1904, that the United States follow the example set by the British, French and Prussian War Offices with regard to maps of other parts of the world and undertake the preparation of a map of North and South America on the millionth scale,† Dr. Henry Gannett was authorized by the then director of the Survey, Dr. Walcott, to prepare a number of maps designed to become part of the United States portion of the International Map.‡ The Twenty-Sixth Report of the Survey (for 1904-05) correspondingly refers (p. 159) to the "compilation of maps of portions of the United States on a manuscript scale of 12 miles to the inch with the purpose of publishing them in sheets on a scale of 1 : 1,000,000" as part of the office work of the Division of Geography and Forestry for that year. The two subsequent reports give slightly different accounts of the purpose of the map. The Twenty-Seventh Report (p. 21) refers to progress made in the "assembling of data for the preparation of geologic maps of the States, or of groups of States, on the scale of 1 : 1,000,000." The Twenty-Eighth Report (for 1906-7), the first published under the present director, Dr. George Otis Smith, contains the first definite announcement (p. 4) of the fact that the Survey had undertaken the preparation of a map of the United States according to the scheme "adopted by international agreement," to which is added, however, the statement that this map "will be employed primarily by the Sur-

* Twenty-Fifth Annual Report, p. 237.

† Report Eighth Intern. Geogr. Congr., pp. 555-557.

‡ Bailey Willis: The International Millionth Map of the World, *Natl. Geogr. Mag.*, Vol. 21, 1910, p. 127.

vey as a base for a general geologic map of the United States, but the base will be designed with a view to all the manifold uses which Federal and State officials and the people have for a general map."

The next reference to the progress made on the United States portion of the International Map is found in a letter from Dr. Gannett to the President of the Ninth International Geographic Congress at Geneva, dated June 30, 1908.* In it mention is made of the compilation of manuscript contour maps of different states on the scale of 12 miles to the inch, the following states being designated as completed in addition to those enumerated in the Twenty-Fifth Report: Ohio, Oklahoma, Kansas, Nebraska and Utah. Arizona, Wyoming (these two were given as completed in the Twenty-Fifth Report) and California are reported as almost complete, and Oregon Nevada, Idaho and South Dakota as partially compiled. A map of the United States showing the areas compiled, together with a photographic reduction to 1 : 1,000,000 of the map of Colorado, accompanied this letter.

These state contour maps, although covering about twenty-eight per cent. of the area of the United States, were finally not destined, however, to be used as direct bases for the International Map owing to the fact that the Survey committee entrusted with this matter subsequently decided that they were not adequate for this purpose. Nevertheless, their compilation was in no way in vain. Their preparation and the various discussions of the subject resulted in the decision of the Survey to begin anew the compilation of sheets of an international map, in the belief that in a short time the standardizing of this undertaking would be assured. The work was entrusted to the Topographic Branch, under the general supervision and direction of R. B. Marshall, Chief Geographer. A. F. Hassan, cartographer, was placed in direct charge, and in June, 1908, the compilation of the first sheets of the United States portion of the International Map of the World was begun. Photographic copies of the sheets were exhibited at the meeting of the International Map Committee in London in November, 1909. It was a source of gratification to the Survey that the size, the general style and, in the main, the conventional signs used on these sheets were adopted by the committee.

The rules governing the preparation of the International Map once laid down the progress of the United States portion could advance

* Compte Rendu, Neuvième Congr. Intern. de Géogr., Geneva, 1909. Vol. I, pp. 333-334.

rapidly.* Only a little over two years elapsed after the London meeting before the first sheet, North K-19, was issued in February, 1912. This was a preliminary edition without hypsometric coloring: the final edition has just been published in October.

Before referring to this sheet a few words with regard to the method of compiling the map and its present state of progress may be of interest.

The map is compiled on the scale of 1:500,000 as a base map, *i. e.*, the topological element (drainage, boundaries, railroads, towns, etc.) alone, exclusive of relief, is prepared. The area thus completed is shown in stippling on the accompanying index map (on which the Maryland portion of Sheet J-17 and the Louisiana portion of Sheet H-16 should also be stippled). The unit for compilation is the international sheet.† Frequent demands for base maps of states, however, have led, in some cases, to the compilation of state portions of an international sheet prior to its completion as a unit. The proper portions of the relevant international sheets are then assembled by states to be reproduced on the same scale by photo-lithography and published in black and white as state base maps. State base maps on the scale of 1:500,000 have already been published of the following states, as will be seen on the accompanying map: Vermont, Indiana, Illinois, Iowa, Minnesota, Mississippi, Georgia.‡ Other base maps are in course of publication of North Carolina, Wisconsin, Michigan, Connecticut, Massachusetts, Rhode Island, Tennessee, Alabama, Wyoming, New York, Pennsylvania and Florida.

The complete base material has been compiled for Sheets L-15, K-16, K-17, K-18, J-18, I-16, I-18, H-16, H-17 and G-17; these are indicated on the accompanying map by marginal shading. In their manuscript form these sheets still lack relief. This element is compiled on the same scale as the base map, 1:500,000, not on the original drawing, however, but upon a lithograph of it. The original drawing is thus available for reproduction as a base map in whatever form desired. The relief and the base sheets are then each reduced to the scale of 1:1,000,000, engraved and combined to form a complete sheet of the International Map.

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* Subsequent reports of progress are given in the Thirtieth Report, p. 88, the Thirty-First Report, p. 89, and the Thirty-Second Report, p. 122.

† The legend on the accompanying map should correspondingly be corrected to read under (b): "Base sheets (scale 1:500,000) of the International Map completed, but not yet published."

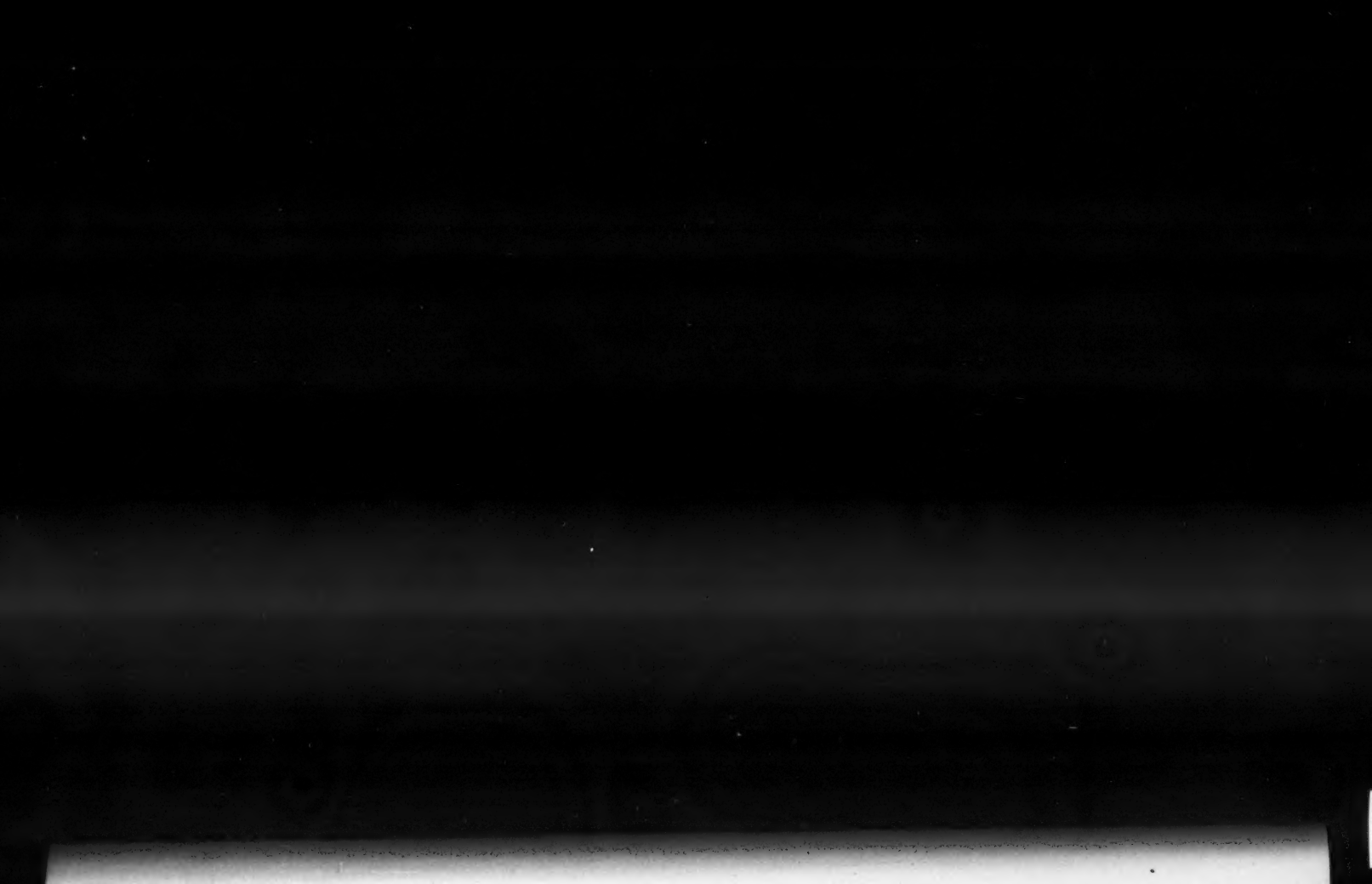
‡ These are sold by the Survey at the following prices: Vermont, 10 cts.; Indiana, 15 cts.; Iowa and Mississippi, 20 cts. each; Illinois and Georgia, 25 cts. each; Minnesota, 40 cts.

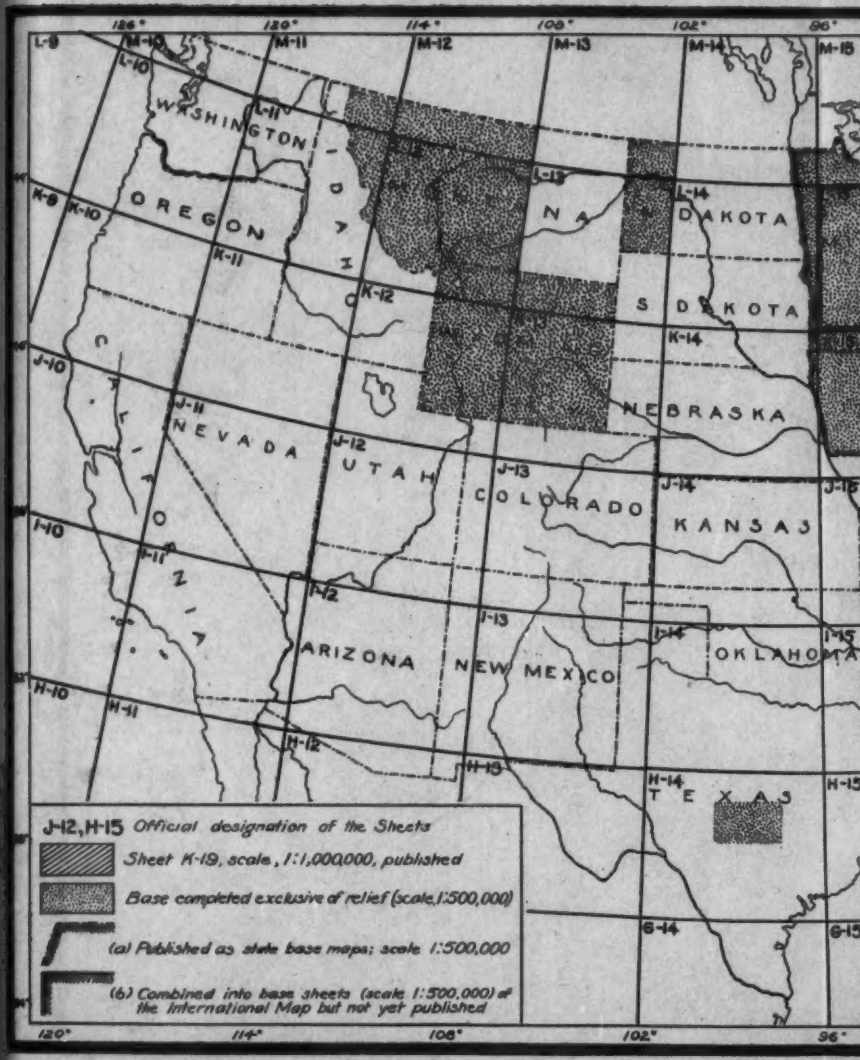
The compilation of the United States portion of the International Map is rendered difficult by the lack of uniform sources. For the five-eighths of the United States of which no topographic sheets exist use is made of various sources. An important source are the numerous maps accompanying the publications of the Survey itself and of the organizations of which it is an outgrowth, as well as of the various state geological surveys. For the thirty odd public land states the maps of the General Land Office are available. The state maps on the scale of 1:760,320 issued by this office are not used in the compilation: reference is made to the township plats and the original maps on a larger scale. Where no other material is available recourse is had to county maps and atlases. Railroad profiles supplement the elevations determined by the Geological and the Coast and Geodetic Survey. The coast line is taken from the detailed charts published by the latter organization, and the ocean floor bordering the continent is compiled from the soundings on the charts both of the Coast and Geodetic Survey and of the Hydrographic Office.

It is this relative inaccessibility of the source material, coupled with the relatively large scale of the map and the requirement that certain elements, notably relief, be represented on it, which make the publication of this map of the United States so important. The best general maps of the United States heretofore available, those in such standard atlases as the Stieler, the Andree, the Vivien de St. Martin, although thoroughly scientific compilations, could not, because of their necessarily small scale, satisfy the geographer's every need. A general large-scale map of the United States has been a long-felt want.

How admirably the present map fills this need is evident from a perusal of the sheet just published.* For the first time a representation of real geographic value is here available of so important a part of the United States as central eastern New England. Although belonging to the oldest settled portion of the country, a part of the territory shown on this sheet is here even represented adequately for the first time, irrespective of scale. This is New Hampshire, between 43° and 44° N. Of this region, which includes the southern part of the White Mountains, no topographic sheets, except the Winnepesaukee and Dover sheets, exist, and no generally accessible representation with an adequate treatment of relief has been available. The main source of information in the compilation of this district was the

* Sold by the Survey at 40 cts.





MAP SHOWING THE ARRANGEMENT AND STATE OF PROGRESS OF THE SHEETS

E SHEETS OF THE INTERNATIONAL MAP OF THE WORLD FOR THE UNITED STATES.

Atlas of New Hampshire on the scale of 2½ miles to the inch by C. H. Hitchcock, the head of the former geological survey of that state. In the representation on the new sheet of relief below 100 meters, furthermore, the Survey has fortunately made use of the latitude allowed by the international agreement* and added the 50 meter contour. A striking element of the sheet is the representation of the ocean floor. The consistent use of the 100 meter interval for the isobaths has produced a clearer picture of the continental shelf in this region than any other heretofore available. Additional valuable elements represented on this sheet which are not generally shown on maps of this nature are: main roads, electric railways, and two classes of railroads, distinction being made between single and double or more track railroads. In the representation of railroads, whose anthropogeographic importance was recognized in the international agreement by requiring this very distinction, the use of a heavier line, even if not as heavy as that shown on the model sheet accompanying the international agreement (cf. *Geogr. Journ., ut supra*), might have been of advantage. The choice of a conventional symbol, too, for cities of less than 500,000 inhabitants may, especially in the case of our extensive American cities, lead to misconceptions. Thus the area between Cambridge and Boston appears uninhabited. This fact, too, together with the unfortunate selection of the State Capitol as the center of the circle representing it makes Providence, R. I., appear an inland city with its nucleus lying to the north, instead of to the south, of the Union Station. These geographic anomalies would be obviated by actually representing the built-up areas, by shading, for instance. The examples cited prove that such a representation is not beyond the range of expression of the map as determined by its scale.

These slight defects are entirely secondary, however, and in no way detract from the fundamental importance and value of the map. As has been seen, many of the valuable features of the map are due to the excellent requirements of the international agreement (mainly, let it be repeated, the one making obligatory the representation of relief by hypsometric coloring) which cannot but guarantee its high geographic quality. But it is equally true that the excellence of Sheet North K-19 is due in no small measure to the efficient work of the Geological Survey. A comparison of this sheet with the other sheets hitherto published, North K-35, M-31, O-29, O-30 (the

* *Geogr. Journ.*, Vol. 36, 1910, pp. 179-184.

latter two preliminary proofs) and South H-34, without being invidious, will readily show this. The representation of all isobaths at an interval of 100 meters compares favorably with their absence below 200 meters on sheets North K-35 and O-29, as does the maintenance of the 100 meter interval for contours up to 600 meters with the use of the 200 meter interval on sheets North O-29, O-30 and K-35. The technical reproduction, too, is worthy of high praise. In delicacy of execution it may well be considered the best among the sheets hitherto issued.

The publication of the first sheet of the map of the United States as a part of the International Map of the World will thus be seen to be a cause for congratulation on the part of the geographic world. Its completion within reasonable time and the maintenance of the standards set by its founders are insured by the high efficiency of the Geological Survey.

THE ORIGIN OF THE HIMALAYA MOUNTAINS*

The value of this paper lies in its application of mathematical analysis to the investigation of features of the earth's surface. The facts adduced from a consideration of the geodetic evidence applied to the genesis of the Himalayan uplift may, in the main, be summed up in the hypothetical existence of a sub-crustal rift that is possibly in the course of present widening towards the north.

The following are phenomena of observation:

1. A rock trough filled with alluvium traverses northern India.
2. The edges of the trough are parallel.
3. A line of deficient density, presumably in the sub-crust, is found to traverse the whole trough.
4. The earth's surface north of the trough is heavily wrinkled.
5. The surface of the trough is not wrinkled.
6. The mountain wrinkles north of the trough are compensated by deficiencies of density beneath them (but these deficiencies are not comparable in degree with the deficiency underlying the line just south of the base of the mountains).
7. The trends of the main granite ranges of the Himalayas, Karakoram, and Hindu Kush, as well as of the minor ranges, are parallel to the line of low density and to the edges of the alluvial belt.
8. The mountain folds north of the trough are overthrust towards the south.

The Indo-Gangetic alluvial belt is well defined. It separates the tertiary formations lying to the north from the pre-tertiary table-land forming the Indian peninsula. The parallelism of its edges constitutes a feature of particular interest. This is revealed on the map by the trend of the Himalayan, Hindu

*On the Origin of the Himalaya Mountains. A Consideration of the Geodetic Evidence, by Colonel S. G. Burrard. 26 pp. Map. *Prof. Paper* No. 12, Survey of India, Calcutta, 1912.

Kush* Sulaiman and Kirthar ranges on the one hand and the similarly irregular course of the border line skirting the foot of the northerly outliers of the pre-tertiary continental relics. The recurrence of the same phenomenon farther west on the opposite shores of the Gulf of Oman and the Persian Gulf is even more remarkable. All southeastern Arabia can be geologically correlated to the Indian peninsula. The whole chain of mountains that rises on the border of Kurdistan and of Persia is a Tertiary uplift. So is the southerly extension of this chain in Beluchistan. The intervening sea corresponds to the Indo-Gangetic alluvial belt. The parallelism is well marked at Bendar Abbas and Cape Massandom. It does not appear to end at this region, however. Another alluvial belt extending almost to the Mediterranean forms the basin of the Euphrates and the Tigris. This basin is the zone of separation between the tertiary uplifts that converge in three great arcs at Mount Ararat and the pre-tertiary Arabian land mass. Each of these belts can furthermore be considered as links in a probable belt of fracture that encircles the globe, and a section of which extends uninterruptedly from the straits of Gibraltar through the Mediterranean, the Mesopotamian valley, the Persian Gulf, the Indian Ocean, the Indo-Gangetic alluvial plains and the Arrakan coast down to Sumatra.

The results of plumb-line observations in the Indo-Gangetic plains may be summarized as follows: the deflections of the plumb-line show most extraordinary variations all along the foot of the Himalayas. Between Kurseong and Jalpaiguri, in the Eastern Himalaya, for example, the deflection changes 45″ in 25 miles. This variation calculated from the uncompensated topographic features should be 25″. On Hayford's hypothesis of isostasy it should be 15″.

Again between Birond and Nimkar in the Central Himalayas the deflection of gravity changes 43″ at the foot of the mountains. This variation as deduced from topographic features and uncompensated is 31″. On Hayford's hypothesis of isostasy it is 13″.

Passing to the western Himalayas, it is found that the change in deflection between Dehra Dún and Kaliana is 30″ as observed. That deduced from topographic features is 29″, while the variation calculated on the Hayfordian hypothesis is 15″. The Himalayan foot is therefore characterized by the existence of a long line in which the change in deflection is actually much larger than it would be if the whole uplift were exercising its entire attraction uncompensated.

In discussing the meaning of the line of low density it is assumed that the Himalayas are isostatically compensated in accordance with Hayford's hypothesis. Considering the data from the typical stations of Kurseong and Jalpaiguri it is found that throughout 2,000 miles in length round the foot of the Himalayan mountains we have an unexplained change in deflection of 30″ in 25 miles.

The extraordinary rift in the deflections all along the foot of the Himalayas renders the consideration of Himalayan compensation very difficult. The effects of the rift are so great that they obliterate the effects of topography and isostasy.

*The trend of the Hindu Kush Range mapped on Pl. II. of Colonel Burrard's paper does not coincide with its ordinary representation. It is usually shown as rectilinear instead of convex to the north as in this instance. It is assumed, of course, that the strike thus mapped is based on the work of the Indian Survey and that it hence merits preferably universal adoption. The argument, however, does not rest on the matter of the southerly concavity of any of these four main ranges. It rests on the parallelism of the edges of the alluvial belt. Thus viewed the constancy of this parallelism is unmpaired by the locus of the Hindu Kush represented on the above mentioned plate.

In the alluvial plains of northern India, the observed deflections are in opposition to both the topography and to the theory of isostasy. We have here:

Mean observed deflection	5″ south.
Mean topographic deflection	10″ north.
Mean Hayfordian deflection on the hypothesis of isostasy	1″ north.

The southerly deflections prevailing throughout the northern portion of the Peninsula cannot be accounted for by the hypothesis of isostasy nor can they be attributed to the topography. In the central portion, on the other hand, northerly deflections are met with which are less at variance with the results due to the topography.

The value of Colonel Burrard's work will be enhanced by a comparison of the relation between its results and the geology of the regions investigated. The subject of gravity anomalies in the United States has been investigated by Bowie* who found that, while they appear to be very small, they are related to the surface geologic formation. The study of the origin of any mountain chain, however, is necessarily subordinate to the collation of data afforded by all branches of human knowledge. Evidence based on results obtained along a determined line of observation is necessarily incomplete and must be supported by information derived from what may often appear to be a remote source. In the present instance, the mathematical factor introduced by geodetic computations may be said to impart weightier consideration than the tenor of the Suessian views which are based chiefly on tectonics and wherein the accumulated details refer to the larger features of the problem. A study of the physiography of the Himalayas would also probably throw further light on the genesis of the uplift. Particularly so if applied to the consideration of contemporary mountain-making agencies. More knowledge on the line of deficient density might also be obtained by geodetic observations at other points of the belt of fracture encircling the globe, especially in the northern West Indies and the Isthmus of Tehuantepec.

LEON DOMINIAN.

EMIL VON SYDOW AND THE DEVELOPMENT OF GERMAN SCHOOL CARTOGRAPHY

In the *Geographischer Anzeiger* for September, in connection with the centenary of his birth, an interesting summary is given of Emil von Sydow's influence on the development of school cartography in Germany. Born in 1812, he was trained for the army and received his officer's patent in 1830. During his studies he devoted himself especially to the geographical side of military science. This led to his appointment, three years later, as instructor of geography at the institution where he had received his training, the Military Academy at Erfurt. This position he occupied from 1833 to 1843.

He felt keenly the lack of adequate material for teaching geography, especially the lack of good wall maps. Unexpected success in the preparation of such maps in his spare hours encouraged him to approach Justus Perthes in

* "Some Relations between Gravity Anomalies and the Geologic Formation in the United States," by W. Bowie. *Amer. Jour. of Sci.*, March, 1912, pp. 237–240.

Gotha, with a view to their reproduction. The firm undertook their publication, and thus began a phase of its activities which has grown to large proportions. As von Sydow's drawings were not suited for reproduction, new ones had to be prepared. This was done in part by trained cartographers of the firm. Von Sydow himself, however, using original material in the Perthes library, undertook the representation of relief. This he considered the most important element. His conception of the ideal wall map was that it should enable the student to reproduce from memory any profile desired through the country represented.

Twenty-four maps were planned for this series of wall maps, one for each continent as a whole and several for subdivisions of the continents. In 1838 the first map, that of Asia, was published. Shortly after, young von Sydow—he was only 26 years old—received a letter from Carl Ritter speaking highly of the new map. "By its excellent arrangement," he wrote, "by the simple yet forceful treatment of its essential elements, by the avoidance of unnecessary names and by its pleasing color scheme, the map gives the impression of a direct picture of nature rather than of a mere paper surface." Maps of Europe, Africa, North and South America together, and of the world, followed during the next two years. Of the special maps only Germany was ever published, in spite of the success with which the series met, as von Sydow had in the meantime turned to other work, the preparation of a school atlas.

This atlas was published under the title of "Methodischer Atlas für das wissenschaftliche Studium der Erdkunde" (1842-44). Its aim and the treatment of its subject-matter were the same as those of the wall maps. To obtain a faithful picture of the relief of the earth's surface, as on the wall maps, blue was used for drainage, brown for highlands and green for lowlands. The atlas consisted of 30 maps in two parts containing general maps of the continents and special maps of Europe. A supplement was added later of maps of regions of special interest, such as the West Indies, the Near East and India.

Although the atlas was very favorably received its relatively high price prevented it from being used in the schools as extensively as von Sydow wished. He therefore undertook the preparation of another atlas. This was published in 1847-49 under the title of "Schulatlas in 42 Blättern." Its success is attested by the fact that up to 1880 it had passed through 32 editions. In 1888 it was entirely revised by Hermann Wagner and has since been published under the well-known title of "von Sydow-Wagner: Methodischer Schulatlas."

The preparation of these atlases was undertaken while von Sydow was engaged in his regular military activities. Cartography was so dear to his heart, however, that when, in 1855, the firm of Perthes invited him to join its scientific staff, he resigned from the Military Examination Board and accepted.

For five years von Sydow was connected with the Gotha geographical institute. He completed the series of outline and mute maps, intended for use as base maps or for repetition, which he had begun in 1847. This series consisted of a "Gradnetzatlas" (1847), showing the map net only, a "Hydrographischer Atlas" (1847), showing in addition the drainage systems of the regions represented, an "Orographischer Atlas" (1855), showing relief, a "Hydrotopographischer Atlas" (1855), showing drainage and the location of towns, and an "Orohydrographischer Atlas" (1856), showing relief and drainage. The value of this series and the soundness of the pedagogical principles underlying its preparation is again attested by its re-publication under the editorship of Dr. Hermann Haack in revised form in 1907 after a lapse of sixty years.

It was also during his connection with the Gotha institute that von Sydow began that excellent survey of current European maps which he contributed to *Petermanns Mitteilungen* under the title of "Der kartographische Standpunkt Europas" from 1857 to 1872. This survey represented a new departure in geographical criticism. The irregularity and, in part, discontinuance of various later efforts along similar lines attest the unique fitness of von Sydow in this field and the difficulty of replacing him.

In 1860 von Sydow responded to the call to return to military life. He resumed his position as member of the Examining Board and as Professor of Military Geography at the Military Academy in Berlin. In 1867 he was appointed director of the Geographical-Statistical Section of the General Staff, with which organization he was associated until his death in 1873.

Although after his departure from Gotha von Sydow was no longer able to devote his time to school cartography, his methods had taken firm root in the Perthes institute and through it made their influence felt on the general development of school cartography in Germany. For it may be said that the recognition of the physical map as the basis of all geographic work and the representation of the relief of the earth's surface by means of the now standard colors, blue, green and brown, is the work of Emil von Sydow.

GEOGRAPHICAL RECORD

NORTH AMERICA

THE TRANSCONTINENTAL EXCURSION OF 1912. As a concise report on the Excursion will be published later, only a few special matters will be referred to here. The itinerary given in abstract in the September *Bulletin* (pp. 667-668) was adhered to in every particular with two exceptions: the return from Crater Lake on September 18 was made to Medford instead of to Klamath Falls (this change had already been decided upon before the departure of the Excursion); and the forced omission of St. Louis on October 8 because of a day lost through excessive rainfall at the Roosevelt Dam. Instead, the Excursion proceeded directly from Kansas City to Memphis, arriving there at the appointed time on October 9.

If the general impression made by the Excursion were to be summarized in a few words it would be to record the amazing number of distinct geographic types passed through in eight weeks. The wonder grew, especially among the European members, at the great variety of pictures that was constantly passing before their eyes. In this very rapidity of the changing scene lay the object-lesson of the Excursion, both to Europeans and Americans, namely the secret of the power of the nation that has by the vitality of its civilization knit together into one homogeneous whole, regions of such diverse geographical nature.

On the afternoons of October 17 and 18, meetings were held in the museum of the Hispanic Society of America at which papers were presented by a number of the European members. These papers, as well as others prepared by many of the foreign guests, will be published by the Society.

On the evening of October 17 a very enjoyable reception was given at the Society's house, with music by the Kneisel quartet and songs by Mr. Henry T. Burleigh. The Transcontinental Excursion ended with a dinner in honor of

the European members at the Waldorf-Astoria on October 18. Before parting, each European member received a silver plaquette bearing a replica of the Society's building as a souvenir of the Excursion. The dinner was characterized by a spontaneity and informality that spoke of the ties of friendship that had grown up during the Excursion.

THE BRYANT EXPEDITION TO LABRADOR. The party included besides Mr. Bryant, President of the Geographical Society of Philadelphia, Mr. Russell W. Porter, topographer, two Newfoundland canoemen and two native guides. Three months, last summer, were spent in the exploration of the St. Augustine River, which enters the Gulf of St. Lawrence in Canadian Labrador. The party reached the Hudson Bay Company's post at the mouth of the river on July 6. On July 12 the ascent of the river was begun. Advancing in three canoes good progress was made, and on the fourth day the lower falls were reached, 55 miles from the mouth of the river. Its source was eventually attained in a lake on the Height of Land, 141 miles from the point where the stream enters the Gulf of St. Lawrence. Some time was spent in locating the Indian route of travel across the watershed. One of the canoemen had previously injured his knee and his condition obliged the party to return to the mouth of the river, which was reached on Aug. 23. According to *The Bulletin of the Geographical Society of Philadelphia* for October, 1912, Mr. Bryant's party was the first to ascend and correctly map this important river.

In addition to the geographical work accomplished, geological and entomological collections were made and photographs secured illustrating parts of the interior heretofore unvisited by white men.

OPENING OF LIVINGSTONE CHANNEL. The formal opening of the Livingstone Channel, 12 miles in length, through the shoal waters of Limekiln Crossing at the mouth of the Detroit River, occurred on October 19. This deep channel has been excavated through solid limestone and affords a straight and safe passage for the immense vessel traffic of the Great Lakes. The channel, 4⅘ miles of which lie in Canadian waters, has been some years under construction by the U. S. Government at a cost of about $10,000,000. Before its completion it was a constant menace to navigation. It is expected by shipowners that the next session of the Canadian Parliament will provide for constructing a channel on the Canadian side of Fighting Island, the estimated cost of which is not high, as excavation would be in earth. The work of widening Ballard's reef channel will be completed next season. (*Daily Cons. and Trade Rep., No. 260, 1912.*)

RELATION OF CLIMATE TO AGRICULTURE IN WISCONSIN. The University of Wisconsin Agricultural Experiment Station has issued *Bull.* 223, "The Climate of Wisconsin and its Relation to Agriculture," by Prof. A. R. Whitson and Mr. O. E. Baker. The bulletin contains excellent geographical material such as climatic maps both of the United States and of Wisconsin. The climatic influence of Lakes Michigan and Superior, of the Mississippi River valley and other river valleys comes out plainly. The small relief of Wisconsin is reflected in the slight variations of temperature due to difference in altitude; in no case does difference in altitude alone cause more than 2.5° F. difference in mean annual temperature. So marked is the influence of Lake Michigan upon the climate of the adjacent land that the mean winter temperature at the southernmost point of the state varies only 2° F. from that at the north end of the Door County peninsula. The effect of the lake in retarding spring is equally noticeable. Along the Mississippi River spring comes earlier than at corresponding latitudes on the shore of Lake Michigan.

The authors point out that, as far as crops are concerned, the temperatures above 42° F. are the ones which give "effective heat." While the valleys of the Rock and Mississippi rivers get a daily average of 20° F. of effective heat during the six growing months (April-September), the northern uplands get only three-fourths as much.

As a whole, Wisconsin experiences a very wide range of temperature. The average yearly range at Milwaukee is 107° F. At Barron, in the northwestern part of the state, it attains 129° F. The lowest temperature recorded is —50° F. and the highest 111° F., making an absolute range of 161° F.

The length of the growing season period (period between killing frosts) varies greatly from south to north, ranging from 175 days in the southwest to 75 days in the northern interior. The length of the former is that of the growing season in the Valley of Virginia; of the latter, that of parts of Saskatchewan and Alaska. Nearly 70 per cent. of the rainfall comes from April to September, when it can do most good to crops and pastures. The average snowfall for the whole state is not far from four feet a year.

Under the head of "Climatic Provinces" the authors list eight sections of the state, corresponding to the principal valleys, highlands and lake-shore strips. They point out that, while the influence of Lake Superior upon climate is very noticeable, as a factor in fruit growing, the influence does not extend over five miles inland. Maps show the relationship between climate, crops and dairying. Cheese factories are almost wholly confined to the region whose growing season is less than 150 days, while butter factories prevail in the corn belt, where the growing season exceeds 150 days. The two choice fruit-growing districts are two peninsulas, Door County peninsula extending into Lake Michigan and Bayfield peninsula, extending into Lake Superior.

R. H. Whitbeck.

CENTRAL AMERICA

A Society for Seismological Observation in Costa Rica. This association was formed immediately after the intense seismic activity of 1910. Its object is to gather under one head the data collected by observers throughout the republic and to inaugurate a series of more systematic observation of the seismic and volcanic phenomena in Costa Rica. It will be known as the "Centro de Estudio Sismológicos." Its founders are Lic. Cleto González Víquez, former President of Costa Rica; Don Anastasio Alfaro, Director of the National Museum; Dr. Gustavo Michaud, Director of the Laboratory of Commercial Chemistry; Don Pablo Biolley, superintendent of the seismological service of the National Observatory; Professor Juan Rudin; Don Elías Leiva; Don Higinio Cots; Don César Cots, and Don J. Fidel Tristán.

Stations have been established at San José, Heredia, Alajuela, San Carlos, Barra del Colorado and Puntarenas. Correspondents have also been appointed at Las Cañas, Liberia, Nicoya, Curridabat and Limón. The results of observation and study will be published in the "Anales del Centro de Estudios Sismológicos de Costa Rica," the first number of which was published at the beginning of this year.

SOUTH AMERICA

Means of Communication in Colombia. The main artery of communication is the Magdalena River, navigable for shallow-draught and stern-wheel steamers as far as La Dorada, 600 miles from its mouth and not more than 600 feet above sea-level. The detritus carried down from the upper river is undoubtedly silting up the river in its lower course. The friable nature of the soil in places increases the evil, which is further emphasized by the washing out of trees which encumber the river-bed and present serious obstacles to navigation. The fluvial tax of $2.50 per ton, charged on all merchandise carried on the river, if applied to the dredging and clearing of a navigable channel, would render navigation possible. In dry seasons a journey of six to eight days is often prolonged to twice that number and may be indefinitely delayed by the grounding of the steamer on a sandbank, where it remains until the river rises. This condition of affairs reached a climax at the end of 1911 and the beginning of 1912, when drought reduced the river-level by several feet below normal and almost caused the total suspension of the river traffic.

In Colombia there were, at the end of 1911, only 600 miles of railroad in operation. This total is made up of 12 distinct lines. Of these three unite, or are destined to unite, the adjacent Atlantic ports of Puerto Colombia, Cartagena and Santa Marta with the Magdalena River above the bar which obstructs its mouth to ocean-going steamers.

Failing river and railway communication, Columbia relies largely upon

horse or mule transport, which is indeed the only practical means of locomotion in the mountain districts. The best road in the country is the Great Central North Road, a macadamized road which, when completed, will lead from Bogotá to Cúcuta, near the Venezuelan frontier, via Tunja, Toata, and Pamplona. (Condensed from *Board of Trade Journal*, Vol. 78, 1912, No. 813, p. 691.)

New Lighthouses in Peru. Two new lighthouses, with flashlights, have been put in service off the North Peruvian coast since Sept. 24, 1912. Built on the Lobos de Tierra and Lobos de Afuera islands respectively, they are mounted on white, conical towers on the highest points of the islands. The Lobos de Tierra light is 73.6 meters above sea-level and is visible for 23 miles to an observer 6 meters above the water. The Lobos de Afuera light is 99.32 meters above the sea and is visible for 26 miles to an observer 6 meters above the water. (*Peru To-day*, Aug., 1912.)

A New Chilean Publication. Chile has a new monthly devoted to the industrial and economic development of forestry, fishery and hunting. It has been issued since July by the "Inspeccion General de Bosques, Pesca i Caza" at Santiago, and its title is *Boletin de Bosques, Pesca i Caza*. Special attention will be paid to the conservation of natural resources within the scope of these departments; also to the preservation of national, and the acclimatation of foreign species. Señor Félix Pinto Ovalle is the editor.

The Argentine Meteorological Service. The Argentine Weather Service was established by the late Dr. B. A. Gould in 1872, and the results of the observations up to the date of his retirement were printed in four large quarto volumes. The Service was continued along the same lines by the present Director, Mr. Walter G. Davis, until 1900. The first daily weather map was published in 1902. Forecasts are issued for thirty-six hours in advance. The daily weather maps show the conditions existing from Para (Brazil) to the southernmost limits of Argentina, extending over 55° of latitude. In addition to the central station at Buenos Aires, there are two principal observatories, at Cordova and at Chacarita, where special researches are carried on. A fully equipped meteorological and magnetic station is maintained at South Orkney, in latitude 61° S. The work of the meteorological office includes a seismological service, and this will soon embrace a line of stations along practically the whole of the north to south extent of the Republic. A hydrometric service and a magnetic service are also included. At the present time the Argentine Weather Service embraces 35 first order, 156 second order, 10 third order, and 1,600 rain-gauge stations. All of these are within Argentina and Paraguay. Observations are received daily from 12 stations in Brazil, 10 stations in Chile, and 6 stations in Uruguay ("The Argentine Meteorological Office," by Walter G. Davis.) *Symon's Met. Mag.*, April, 1912. R. Dec. Ward.

AFRICA

A French Scientific Expedition to Morocco. A party of well-known specialists will shortly be sent to explore Morocco under the auspices of the Société Géographique de Paris aided by the Académie des Sciences, the Musée d'Histoire Naturelle and various banking institutions. According to the *Bulletin* of the Società Geografica Italiana for October, 1912, L. Gentil, whose work on Moroccan geology is well known, will have charge of the geology and mineralogy. Mr. Bauguil, the director of the Algerian veterinary department, will be in charge of agronomy. Mr. Pallary, who has devoted himself for fifteen years to the study of Moroccan fauna, will carry on further zoological research. The flora of the Chaouïa will be investigated by Prof. J. Pitard of Tours. These investigations are expected to last four or five years. They may be prolonged provided the necessary funds are raised by the Société Géographique de Paris. The results obtained will be published at the end of each year's work.

Results of the Segonzac Moroccan Expedition. The Sebu basin, in North Morocco, has been surveyed, as well as the valleys of the Wadis Rdem, Beth

and Remel. The surveys show that the course of the Sebu is exceedingly sinuous in the region of its headwaters. A section of this meandering waterway revealed in one instance a curved bed 7 kilometers in length, the extremities of which were hardly a few meters apart. Despite the resulting inconvenience to navigation it was ascertained that the river is practically navigable throughout the whole year except in the vicinity of Mesra and Ksiri. In the neighborhood of Melaina only nine months of river navigation can be counted upon. It was also found that the harbor of Mehedia, at the mouth of the Sebu, has natural advantages that are lacking, for example, at Larash, farther north. Its depth of 3 meters would permit vessels of 1,000 tons to steam up the river. Farther inland the river port of Knitra was found to be susceptible of improvement. The Sebu here attains a depth of 5 to 6 meters along a section 4 kilometers in length, with low banks on either side.

The valley of the Rdem appears to be the most fertile of the basin, although the entire region explored seemed promising in this respect. According to the *Boll. Soc. Geogr. Ital.* for Oct. 1, 1912, the results obtained by the expedition will be issued in final form about January, 1913.

A New Tilho Mission to Lake Chad. Captain Tilho left France in June for the Chad district, where he is to replace Commandant Colonna de Leca. In addition to his military and administrative duties, Captain Tilho has been entrusted by the Académie des Inscriptions et Belles-Lettres, with the task of discovering the former course of the waterway connecting the Chad and Nile basins. He will also study the application of wireless telegraphy to the determination of astronomic positions in the field, and establish a triangulation framework to be used as a base for topographic surveys undertaken by officers stationed in the Chad district. This work will eventually result in a map similar to that of the region between the Niger and Lake Chad accompanying the reports of Captain Tilho's noted mission. (*Rev. Franc. de l'Etr. et des Col.*, October, 1912, p. 604.)

White Population of the Belgian Congo. The census of the white population of the Belgian Congo, taken by the Government on Jan. 1, 1911, revealed a total of 4,003 individuals. Of these 2,432 were Belgians, 311 English, 215 Italians, 197 Portuguese, 188 Swedes, 121 Dutch, 88 Germans, 77 French, 71 Swiss and 62 Russians. The white population of the Katanga district comprised 747 Europeans, among which 313 were Belgians and 203 English. (*Mouv. Géogr.*, June 9, 1912.)

Survey of the Northeastern Boundary of the Belgian Congo. The survey of this section of the border of the Belgian colony was begun in 1900 as a result of a boundary dispute between the Belgian and German authorities. The English Government subsequently took part, both in the negotiations and the surveys, which were carried on intermittently until 1911. The first six years of this period were spent by the engineers in the Rusisi-Kivu region. The next two years were devoted to the district adjoining the 30th meridian east of Greenwich. A lull in the operations then ensued until 1911, when the Kivu-Mfumbiro survey was begun. The completion of work on this last section also marks the end of the whole task. The results of this undertaking consist in the establishment of a triangulation network extending over a length of 530 kilometers between latitude 1°18′ N. and 1°29′ S. The course of the Rusisi was determined during the first period. The location of the principal mountains in its valley was also ascertained. The western and northwestern shores of Lake Kivu were mapped. The cartographic output was a map of the Rusisi River on a scale of 1:200,000 and a map of Lake Kivu on 1:100,000.

The survey of the region along the 30th meridian was begun in 1903. In 1906 the two surveys were connected by a system of triangulation which connected the Rusisi-Kivu net to a conspicuous summit of Mt. Ihunga. This uplift is a remarkable feature of the topography of the region in which the British, German and Belgian boundaries meet. A triangulation base was also established in the region between 1° N. and 1° S. This served as a skeleton for a map on 1:250,000 of the district along this meridian and between these parallels.

The purely scientific work accomplished consisted in measuring an arc of the meridian from 1° N. to 1° S., and the determination of gravity anomalies. According to a statement by J. Maury in the course of a lecture delivered at Brussels on Jan. 10, 1912, and before the Société Belge des Ingénieurs et des Industriels, the results of this work are to be published both in English and in French.

Divergencies between the British and Belgian Governments caused suspension of the work in 1909. Early in 1910 a commission composed of British, Belgian and German delegates met in Brussels for the purpose of settling this matter definitely. It was decided to adopt a preliminary boundary line starting at a point 0°54′03″ S.; 29°35′14″ E., on Mt. Ngabua and ending at the extinct peak of Mt. Sabyino. This boundary was then extended over the chain of volcanic peaks attaining Karissimbi and thence to a point on the northern shore of Lake Kivu. A party made up of British, German and Belgian surveyors took the field once more for this final determination. The Ngabua-Kivu triangulation base is one of the results obtained by this party. A map on 1 : 200,000 of the Ruchuru valley between 1° S. and the Sabyino parallel was also prepared as well as a 1 : 100,000 map of the German-Belgian frontier between Lake Kivu and Mt. Hehu.

AUSTRALASIA AND OCEANIA

Exploration of German New Guinea. According to information covering the period ending May 15, the expedition under the leadership of Dr. Stollé which was organized by the German Colonial Office and the German Colonial Society to explore the Kaiserin Augusta R., established its main camp in the Hunstein Mountains, above the village of Malu, which lies 270 miles from the mouth of the river (*Geogr. Anz.*, Sept., 1912, reprinted from *Deutsche Kolonialzeitung*, No. 29). An advance party of the expedition had penetrated 115 miles farther upstream to the mouth of the Frieda R., a tributary. Dr. W. Behrmann, geographer of the expedition, had previously traversed the Gazelle Peninsula by a new route. This peninsula consists of a plateau, 1,000 to 1,300 feet high, which has been formed by the ejecta of the volcanoes which rise above it to a height of 2,000 feet above sea level. Dr. Behrmann established a meteorological station on the Sattelberg near Finschhafen. This is the first institution of its kind in German New Guinea.

Rainfall of Australia. The Australian Central Weather Bureau has issued (under date of Sept. 25, 1911), an average rainfall map of South Australia and the Northern Territory. A "memorandum," prepared by Mr. H. A. Hunt, Commonwealth Meterologist, accompanies the map. Only stations with at least fifteen years' records have been used, and all data have been revised up to the end of 1910. The chart shows clearly the rapid decrease of the rainfall from the agricultural areas northwards to the interior, where, in the Lake Eyre basin, the average rainfall is under five inches. The area in square miles in which the fall is under 10 inches is given as 317,600 in South Australia and 138,190 in the Northern Territory. In the latter district the mean annual rainfall is given as 24.65 inches, ranging from 62.12 (at Port Darwin) to 5.54 inches; in the Pastoral Interior 7.26 inches, ranging from 12.99 inches to 3.79 inches; in the agricultural settled districts 18.93 inches, varying from 46.99 (at Stirling West) to 7.12 inches. The line (14-16 inches) representing the limit of safe agriculture is plotted on the map.

The Australian Weather Bureau has also issued, in the form of a picture postcard, an average rainfall map of the Commonwealth, together with a table showing the comparison between the total area of the United Kingdom and the different rainfall areas shown by grades on the rainfall map of Australia.

R. DeC. Ward.

Mr. Churchill's Polynesian Work. With the recent publication of the third volume of his series upon the speech of the Polynesian Pacific Mr. William Churchill is at the middle point of the major project which he is prosecuting with the approval and assistance, so far as relates to publication, of the Carnegie Institution of Washington.

In the first volume of the series the author essayed to clear away the linguistic problems which probably fall within the traverse of the Polynesian race out of Indonesia and into the Pacific. In the course of these particular studies he was able to mass proof of the distinct migrations of two stems of the race which migrated at wide intervals of time and first came together in Samoa, the Proto-Samoan and the Tongafiti migrations. Of the former he traced the voyages as far as Samoa in two traverses through Melanesia, emerging from the Malay Archipelago respectively north of New Guinea and south through the Arafura Sea and Torres Straits. In this work, "The Polynesian Wanderings," he established on linguistic grounds the dissociation of the accepted family of Malayo-Polynesians and settled the problems of Polynesian speech anterior to its settlement in the mid-Pacific.

The second work of the series, a monograph on the Beach-la-Mar jargon, dealt with certain minor linguistic characters which were found essential to the proper establishment of the character of the Polynesian as a simple isolating speech.

In the third work, the dictionary of Easter Island, Mr. Churchill has dealt with the Proto-Samoan element in its further migration eastward. Thus, westward and eastward, effectively earlier than the Samoan settlement and later, the loose ends have been disentangled.. Now the author is at the point where he may approach the central theme, the analytical study of modern Polynesian and its ancient source language. This will be effected through the means of a dictionary of Samoan with full philological apparatus covering the other languages of the family. To accomplish this dictionary it is necessary to publish Mr. Churchill's manuscript collections of Samoan myth and legend.

Upon this collection the author is at present engaged and has already made considerable advance. The material will fall little, if any, short of a million words and will amount to a thesaurus of Samoan literature. The first section of this work is already completed. It deals with the genealogies of Samoan families, and amounts in text and translation to 170,000 words. These records, several of which naïvely run back some half dozen generations anterior to "the creation of god," are of the utmost importance in the establishment of the chronometry of the race.

Another section, already advanced in treatment, will probably extend to about the same number of words. This is the manual of courtesy, a most remarkable feature of the life of savages. It is in a measure a Who's Who in Savagery, for it records for each Samoan hamlet the proper phrases of ritual address to be employed to each chief, it sets down the name of his house, of the place of deliberation of his tribe, the name called aloud when his kava is served, the title of his son and of his daughter.

A third section will be made up of the myth of the Samoans interlaced with history which it will be the end of this study to establish so far as values are ascertainable. The fourth section, separated only for motives of convenience in study, will contain similar material occurring in metrical form. It is hoped that the whole work, with accompanying monographs, may be completed in about a year and find publication in 1914.

EUROPE

Mapping by the British Ordnance Survey. According to "Report of Progress of the Ordnance Survey to March 31, 1912," there is no portion of the world's surface, of a similar area, which has been so minutely surveyed as the hundred and twenty thousand square miles which comprise the United Kingdom. The 1-inch ordnance map has been completed as well as revised twice, and the map will undergo a process of continuous revision so that none of the sheets will be over fifteen years out of date when issued to the public. The 6-inch and 25-inch maps of Great Britain have been completed as well as revised once. The same is true of the 6-inch map of Ireland. The 25-inch map of this island was begun during 1911-1912 and will be finished in 1914. It is also planned that the revision of the 25-inch map of the United Kingdom shall be continuous in such a way that each sheet shall be revised once in 20

years. The revision includes that of the vertical framework, that is of the levelling, and also the keeping in repair of the horizontal framework or triangulation. It also provides more points wherever required. In addition to the above, ½-inch maps on the layer system are being prepared by the Ordnance survey. It was ascertained that the hypsometric coloring used on these maps found ready favor with the officers. The first revision of the ¼-inch map of England is almost finished and more than half of the ¼-inch map of Scotland has been once revised.

WIDENING THE KIEL CANAL. The increasing size of steamships has necessitated widening this waterway to almost twice its capacity. According to the new plans the canal will have a section of 825 square meters, instead of 413 square meters. The terminal locks will be replaced by the two largest in the world, not excepting those at the Canal Zone. These locks will be 330 meters long, 45 meters wide and 13.77 meters deep. Construction work is now being carried on without hindrance to navigation. The widened canal will be completed by 1915. (*Le Tour de Monde,* Oct. 5, 1912.)

THE BULLETIN OF THE SERVIAN GEOGRAPHICAL SOCIETY. The Servian Geographical Society, founded in Belgrade in 1910, has issued the first number of its *Bulletin* (*Glasnik Srpskog Geografskog Drushtva*), which will be issued twice a year. Its form is large octavo, the first number containing 151 pp., with a supplement in French announcing the *Bulletin* programme and giving an abstract of each of the leading papers. These supplements will be bound with the copies of the *Bulletin* sent to foreign lands. The editors are Dr. J. Cvijić, professor of Geography at the Royal Servian High School, and Dr. Paul Vujevic, professor of Climatology and Meteorology at the University of Belgrade. The publication will be especially devoted to the geography of the Balkan Peninsula and neighboring lands, investigations of their physical phenomena, geographical theories and scientific methods, a bibliography of studies in geography and its allied sciences relating to the peninsula and a record of the work and proceedings of the Servian Geographical Society. The first number is handsomely produced and is illustrated by half-tone engravings, diagrams and sketch maps.

ARCTIC

DR. DE QUERVAIN'S TRIP ACROSS THE GREENLAND ICE-CAP. The expedition consisted in addition to Dr. Quervain of six Swiss savants. It started with twenty-nine dogs, three sleds and ten Eskimo bearers. The first difficulty was the reluctance of the bearers to persevere in the venture. They promised to accompany the party for five days, but one by one they deserted. One only stuck through the whole journey.

The ascent toward the interior plateau took ten days, and, on June 20, the expedition began the real journey of crossing the ice wastes. At first they travelled only sixteen miles a day with a view to sparing the dogs. There were tremendous ice crevasses all around. They were in the most dangerous part when suddenly, while on the thin ice of an inland lake, the whole expedition was immersed. On emerging they found that their clothing had been frozen stiff, but fortunately only some of their provisions had been lost.

Gradually the dog marches were extended to twenty-eight miles a day. They were frequently almost overwhelmed by fierce blizzards. The highest point, 8,330 feet above the level of the sea, was reached on July 12. This was in longitude 41°42′ west, latitude 67°23′ north.

Meanwhile the expedition had touched Peary's and Nordensjöld's tracks. It was ascertained that Nordensjöld's Laplanders had not gone so far as had been stated. Their high records did not tally with the facts.

To the northward of Sermilik fiord a great, new mountainous region was located and christened Switzerland. The highest peak seen, 9,200 feet above sea level, was named Mount Forel. It is the second highest peak in Greenland. At this time a new danger threatened the expedition. The food cache on the east coast could not be located owing to an error of the map, but fortunately Angmagsalik was not far away.

Dr. Quervain says the inland ice is not so regular in its formation as has hitherto been assumed. The lowest temperature encountered was —23°. Flora was absent, but birds were located as far as 41° W. Long. The dogs behaved excellently and it was with sorrow that they were slaughtered, but this had to be done as they would not be allowed to enter Angmagsalik. Dr. Quervain is convinced that the dogs are better for this sort of work than the ponies which Captain Koch proposes to use in his expedition. (*The Sun*, Oct. 4, 1912.)

GENERAL

A New Edition of the "Atlas Universel de Géographie." At the meeting of June 7, 1912, of the Société de Géographie, Mr. Shrader announced that the second edition of the Atlas edited by himself is in an advanced stage of completion. The revision of this new edition is facilitated by the excellence of the original work.

A New Periodical on International Economics. A new periodical on international economics entitled "*Weltwirtschaftliches Archiv.-Zeitschrift für allgemeine und spezielle Weltwirtschaftslehre*," will appear in 1913. It will be edited by Dr. Bernhard Harms, professor of political economy at the "Staatswissenschaftliches Institut" of the University of Kiel, Germany. Its chief aim will be to create a central organ, in which all branches of modern international economics, such as exchange of products, migration of capital, international enterprises, etc., may be discussed from a purely scientific standpoint, theoretically as well as practically. Special stress will be placed upon the exposition of the actual facts and the theoretical analysis of the causes and effects of international economy. New books and papers, bearing on subjects appropriate to the magazine, will be reviewed. The editor is a prominent German scholar. He is well known through his book on "Volkswirtschaft und Weltwirtschaft" (1911). He is now writing a work on Canada from the economic viewpoint. His name guarantees a first-class publication.

Charles L. Henning.

The Winds of the United States. In his recent paper (The Winds of the United States and their Economic Uses. *Yearbook, Dept. of Agric. for 1911*, pp. 337-350. Washington, 1912), Mr. P. C. Day rightly says that there is need of a compilation of the available data "in convenient form for ready reference by those interested in the study of the winds, either in scientific investigations or in the practical application of their energy to serve our everyday needs." The present account is a summary of a larger monograph on the same subject which Mr. Day has in hand for publication as a *Bulletin* of the Weather Bureau. On the basis of observations for the 20-year period 1891-1910, inclusive, charts have been constructed showing the average hourly velocities of the wind and its direction, for special months and hours of the day. Diagrams are also given showing the daily march of the winds and their variations at different levels. The somewhat difficult question of changes in velocity due to elevation has been carefully considered in constructing the new charts. The high and favorably distributed wind velocities over the Great Plains, which was clearly brought out by Dr. Frank Waldo some fifteen years ago, appears very markedly on Mr. Day's charts. Emphasis is laid upon some of the economic aspects of wind movement, attention being drawn to the localities favorable for the use of windmills; to devices for obtaining electrical energy from wind power, and to the relation of the winds to aviation. Those who are interested in the more thorough study of American climatology will look forward with pleasure to Mr. Day's complete report. R. DeC. Ward.

GEOGRAPHICAL LITERATURE AND MAPS

(INCLUDING ACCESSIONS TO THE LIBRARY).

BOOK REVIEWS AND NOTICES

(The size of books is given in inches to the nearest half inch.)

NORTH AMERICA

Three Wonderlands of the American West. By Thos. D. Murphy. Pictures by Thos. Moran. 180 pp. Index. L. C. Page & Co., Boston, 1912. $3. 9½ x 6½.

This is a narrative of the author's personal experience, in which the "See America first" slogan is tenaciously sounded. The prospective traveler about to tread the author's trails will obtain in these accounts a preliminary idea of the regions to be visited. Whether his goal be the Yellowstone National Park, the Yosemite Valley or the Grand Canyon he will undoubtedly be able to store preparatory knowledge that will help him to observe with greater accuracy.

The book has no claim to scientific worth. Its value would in no wise have been impaired had the attempt to give an idea of the geological agencies once at play in the Yosemite or the Grand Canyon been omitted.

Pike's Peak, the Garden of the Gods, and other noteworthy Colorado sites are briefly mentioned. Allusion is also made to some ancient Californian cloisters. A set of superb duogravures enlivens the text and helps impart a certain sense of the majestic grandeur of the scenery set before the reader's eyes. The same cannot be said of the color reproductions from original paintings. Fortunately the painter's reputation need not be founded on the riotous display intended to interpret his work. The present reviewer having trodden over the author's paths finds it hard to reconcile his retrospective thoughts of gorgeous yet sober coloring with the somewhat gaudy hues printed on these color plates.

LEON DOMINIAN.

SOUTH AMERICA

A Study of the Question of Boundaries between the Republics of Peru and Ecuador. By Don Vicente Santamaría de Paredes. Translated by Harry Weston Van Dyke. 336 pp. Map. Byron S. Adams, Washington, D. C., 1910. 9½ x 6½.

The strictly legal aspect of this political question is discussed in this work. The English edition before us is a translation from the original Spanish. It is an excellent study of some phases of the transition of Latin-American states from the colonial régime to the stage of national independence. The author has divided his discussion into two parts. The General Part comprises the antecedents and history of the boundary question, while the diverse questions embraced therein form the subject matter of a Special Part. The data and events recorded follow in chronological sequence, thereby facilitating thorough mastering of the case.

Although the book is meant for the jurist, the layman will find much of interest in the historical review of the insurrectionary movement leading to the formation of the Spanish-American states. An account of the origin of the so-called "Spanish-American public law" is also given. This law is taken as forming the legal basis to be adopted in the settlement of the points at issue.

The Special Part is subdivided into two sections dealing with the intercolonial and international boundaries. The successive modifications of the political geography of that section of South America since the dawn of the XIXth century are reviewed. The evidence from all of the aforesaid considerations are resumed in 43 articles from which it is concluded "that the

frontier between Peru and Ecuador ought to be so established as to leave within Peru the littoral provinces of Tombes, the Department of Piura, the province of Jaén and that which was the Gobierno and Commandancia General of Maynas." LEON DOMINIAN.

The Incas of Peru. By Sir Clements R. Markham. xvi and 443 pp. Map, ills., index. E. P. Dutton & Co., New York, 1910. $3. 8½ x 5½.

After a lifetime greater than is granted to most men it is interesting to find that Sir Clements Markham recurs in his age to the theme which first turned his thoughts to geographical research. It would be supererogation to comment upon the services to geography which the author has rendered unstintingly, yet it seems almost valedictory when we find him returning to complete the study which as midshipman he began more than sixty years ago. This work shows no flagging of zeal, its characterizations are as fresh as if written in the author's prime—truly an old man who knows not age save by reference to the calendar.

The study of the Inca culture is intimate. We are filled with amazement that the writer can describe with such fullness of detail and intimacy of observation spots upon which his eyes last rested fifty years ago. Others have written about the Incas, and there is no inconsiderable library on Peru. But one chapter is Sir Clements Markham's own, the drama of Ollantay. In this volume he gives the story of how he became aware of the existence of a manuscript in the hands of a devout descendant of the Incas in a remote mountain valley, of how he was successful in his search, and now he offers a translation which carries the spirit of the original. WILLIAM CHURCHILL.

AFRICA

The Niger and the West Sudan, or the West African's Note Book. A *Vade Mecum* containing hints and suggestions as to what is required by Britons in West Africa, together with historical and anthropological notes, and easy Hausa phrases used in everyday conversation. By Captain A. J. N. Tremearne. 151 pp. George H. Doran Co., New York, 1910(?). $2. 9½ x 6.

The book is a guide for persons bound for western Africa. It fulfills its purpose well. In addition to historical sketches of the various colonies, and compilations of facts and theories as to the origin, relations, and customs of the native races, it contains "hints and suggestions" filling one-third of the book. Appendices give (1) official salary lists, and (2) fairly complete lists of equipment, with costs needed for West African travel, camping and exploring.

The West Coast, with its gold, ivory, game and adventure, is awarded very low rank as a health resort. The author emphasizes the growing conviction that European and American culture as at present grafted on African culture is not the best combination for all concerned. To be taught to work systematically, consistently, intelligently, is the chief need of the negro; not necessarily to wear clothes, to eat cooked meat, drink beer, and adopt European standards of life.

The Gambia River and travel thereon are described; likewise horseback and hammock traveling. The latter is far preferable, because of the comforts possible and the lesser degree of responsibility devolving on the traveler. The treatment of climate and other physical conditions is interesting and instructive. Most of the author's remarks on health seem sane and wise: light eating, abundance of fruit, boiled or filtered water, plenty of sleep, regular hours; but when he adds "stimulants probably do more good than harm," one is inclined to doubt, in view of the large amount of testimony against spirituous liquors in tropical countries. G. D. HUBBARD.

Nigeria: Its Peoples and its Problems. By E. D. Morel. xviii and 266 pp. Maps, ills., index. Smith, Elder & Co., London, 1911. 10s. 6d. 9½ x 6.

This is one of the great works upon that region of tropical Africa which has come into English hands, great because the author is sympathetic with the human

element of the problems there working out, great because he is equipped through long experience to recognize the true terms of the problems. In support of his conviction that there is a future of social development for the African among his own people and in his own home he is singularly fortunate in that Nigeria has afforded a few conspicuous examples of what the African can make of himself in the acquisition of European culture and in the employment thereof for the betterment of his own kind; Blyden is such an one, his life gainsays all the cheap sneer that the African, under the curse of Ham, must always be servile. One point which Morel makes is of peculiar interest. The tangle of languages is great. In the Bauchi province, one of quite small extent, no less than sixty-five distinct languages are in daily use. The English administrators seldom acquire any of these languages, but are forcing upon their territory a new language, semi-jargon in type, that of the Hausa, which has come into use as a trade, and above all as a military, speech. Even the Hausa takes some time to acquire, and for climatic reasons the tour of duty of each official is very brief, therefore, the Kroobov jargon of the Oil Coast is becoming standard for general employment. All this entails a degradation of such indigenous culture as has already developed and works automatically to check the normal evolution which should follow under improved social conditions and which should lead to an African advance. WILLIAM CHURCHILL.

ASIA

On and Off Duty in Annam. By Gabrielle M. Vassal. xi and 283 pp. Map, ills., index. D. Appleton & Co., New York, 1910. 9 x 6½.

Ephemeral though works of this type must be in their very essence, sure to be displaced by later and more complete narratives, we cannot have too many of them. Never yet has there been a survey so complete and so detailed as to erase the value of the preliminary reconnaissance, the accuracy of the noting of fact without connotation and the enthusiasm of the observation of that which is new and newly found. This work is very personal, it is the opening of a new world to Mrs. Vassal, and because it is a new world to the most of us we are all the better pleased to find that the recorder is just such an observer as any of us should be. She starts with the most important thing about her observation of Annam, "a few weeks after our marriage we got marching orders for Annam." In the brief table of the scientific results of what, with the utmost naiveté, she calls "making collections" we encounter *Cissa gabriellae, Lepus vassali,* and *Presbytis margarita,* which may perhaps be an expansion of a middle name hidden beneath an initial. Experience shows that these new species will probably overload the synonymy, but at any rate the friends at home were mindful of her and that is something to bear in mind when one is far away. We welcome Mrs. Vassal in Annam, we welcome her experiences, because she was very observant and set down all the strange things which came her way with no more involved feeling than that because they were of huge interest to her they would be interesting to others. In this new space and the life which fills it she has had no more involved purpose than to make collections. There results a storehouse of information, ethnology of a sort, civic studies of another sort, geography. None of this material will lose its value; observation at first hand is worthy of preservation since it must serve as the best basis for the later and more valuable comparative study.

Her best contribution to geography—for the littoral of Annam is quite well covered in French governmental administrative reports—is the narrative of her excursion to the hills of the less well known interior, somewhat more than a third of the volume. The distance amounts to no more than 200 kilometres, yet from the first night's halting place the country has practically never been recorded. At Daban on the high plateau we learn that a beginning has been made toward the establishment of an agricultural station and that the future of this French possession must rest upon the clear air and wholesome surroundings of these higher lands where Europeans may escape the enervation of the steaming swamps of the coast line. In the hills she records the life of the Mois, a race which seems to be a remnant of that little known people whose scattered remains appear as enclaves in the overlying civilization of the Peninsula all the way from Burma to China. WILLIAM CHURCHILL.

A Year with [the Gaekwar of Baroda. By Edward St. Clair Weeden. 324 pp. Ills., index. Dana Estes & Co., Boston, 1912. $3.50. 9 x 6.

Baroda is one of the native states of India whose ruler bears the title of Gaekwar. This visitor to the princely house is an English clergyman and intimate friend of the Indian ruler. The book was compiled from the weekly letters which the author sent to his mother. It gives an account of the magnificent home and the manner of life of one of India's wealthiest and most enlightened princes. It is not often that the daily activities of a foreign princely family are so fully brought into view as in this book. It is all the more interesting because of the broad views and the sympathetic interest of the Gaekwar of Baroda in the uplift of the masses of the Indian people. The Gaekwar and his wife have met many of the English and American people in their visits to England and the United States.

ROBERT M. BROWN.

A Manual of the Kāshmiri Language, comprising Grammar, Phrase-Book and Vocabularies. By George A. Grierson. Vol. 1: Grammar and Phrase-Book. 159 pp. Index. Vol. 2: Kāshmīrī-English Vocabulary. 211 pp. Clarendon Press, Oxford, 1911. $4 for 2 vols. 6½ x 4½ each.

Undoubtedly, practical convenience is subserved for those who will make the most use of this convenient manual of the Kāshmīrī by the assumption on the author's part of their familiarity with Hindōstānī. At the same time it detracts from the value of this treatise for philologists who would prefer to study this language without reference to a speech which at best is but a jargon. Mr. Grierson has certainly made good his claim to a simplification of the formal grammar of this language. Many of the difficulties which inhered in the older work of Wade he has cleared away. With respect, however, it appears that he has not approached the grammar from the right direction. As a newer philology comes within our reach it must be acknowledged that it will be necessary to revise the attitude of the investigator toward syntax. At present it is almost uniformly the case that grammars of the newly discovered tongues are written in terms of the grammar of the more highly developed languages of inflection. Speech of the classes more primitive than the inflected languages has its own method of making itself comprehended, and that method should be set forth in grammar simply and without prejudice arising out of the recorder's familiarity with principles and methods which belong properly to a more advanced stage of development. Assuming, however, an acquaintance with the jargon of northern Indian it is quite clear that this manual will facilitate acquaintance in Kashmir with the two dialects there in use.

WILLIAM CHURCHILL.

EUROPE

The Port of Hamburg. By Edwin J. Clapp. xiii and 220 pp. Map, ills., index. Yale University Press, New Haven, 1911. $1.50. 8½ x 5½.

"An investigation, not a program nor a prophesy" is the author's characterization of this readable, timely book. The growth of modern industrial Germany created a demand for a modern seaport, a demand which Hamburg, because of its geographical advantages and the enterprise of its citizens, has been able to satisfy and is, in consequence, the second port of Europe. The main advantage of Hamburg are its position near the North Sea on a drowned river and on the navigable Elbe, which extends the city's commercial sphere into Saxony and Austria. This latter factor, in the author's opinion, has placed Hamburg far in advance of its German competitors.

When the monopoly of the Hansa towns was broken by England and Holland, Hamburg became and continued to be a transshipment harbor and entrepôt; the city was a middleman between West Europe and Russia, Scandinavia and North Germany, a condition in operation as late as 1860, when 60 per cent. of Hamburg's trade was from England, from whence it was transshipped to the ports on the Baltic.

When Hamburg joined the German Empire it was stipulated that a portion

of the port should remain free and not subject to the customs duties of the Empire. This has been a favorable factor, for it permits quick loading, unloading and reshipping of goods. Like most North German ports, Hamburg was located inland at the junction of river and ocean navigation. For modern commerce, connection with the ocean has been accomplished at a cost, in fifty-six years, of $12,000,000, by dredging a channel seaward to accommodate the largest ships at high tide and ordinary ships at low tide. The Elbe is so narrow that harbors have been excavated on either side until in 1909 there were 1,575 acres of harbor surface and a total water front of forty-one miles. Around these are quays, railroad tracks and modern facilities for handling freight.

The Elbe, extending its navigable course into Bohemia, constitutes "an extension of the lighterage service of Hamburg." Not only is the river kept navigable, but the principal towns have built harbors and efficient devices for handling freight. Moreover, the Elbe is connected by canals with the rivers of eastern Germany. The Prussian railroads do not cooperate favorably with the Elbe traffic, but the railroads of Saxony and Austria follow the opposite policy, so that the Austrian exports at Hamburg exceed those at Trieste. By favorable rates much export freight is attracted to Hamburg from the west German industrial region, freight that would otherwise pass down the Rhine. The interesting story of the Hamburg-American Line, its rise, development and connection with the home port is told in considerable detail.

The eight chapters treat of (1) the development of the hinterland; (2) the channel to the sea; (3) port facilities; (4) oversea lines; (5) shipbuilders and merchants; (6) waterways and railways; (7) shipping and commerce in 1907; (8) Hamburg's commerce with its hinterland, 1907. Maps and illustrations that illustrate add to the value of the book.

The book is timely and suggestive when so much is being said about the development of American waterways. The readable style and abundance of well chosen facts make it welcome to the teacher of geography, either in secondary school or college.

F. V. EMERSON.

PHYSICAL GEOGRAPHY

Charts of the Atmosphere for Aeronauts and Aviators. By A. Lawrence Rotch and Andrew H. Palmer. 1st edition. 96 pp. of text. John Wiley & Sons, New York, 1911. $2. 9 x 11½.

It was one of the striking characteristics of the meteorological work which was so effectively done by the late Professor A. Lawrence Rotch that emphasis was always laid upon the practical application of the results. Thus, immediately after the founding of the Blue Hill Observatory, in 1885, the issue of local weather forecasts was begun. The splendid series of observations of cloud heights, velocities, directions of movement and methods of formation led to important conclusions regarding the use of clouds as weather prognostics; and the pioneer investigations which were carried on at Blue Hill, and elsewhere, by means of kites and balloons, naturally led Professor Rotch to emphasize the practical application of the results for the use of airmen. Thus, in the valuable set of "Charts of the Atmosphere for Aeronauts and Aviators," published about a year before his untimely death, Professor Rotch, with the collaboration of Mr. A. H. Palmer, of the Blue Hill staff, published, in simple and useful form, with clear, concise descriptive text, the results of the exploration of the free air carried on by Blue Hill Observatory, and on the Atlantic Ocean, the latter in cooperation with M. Teisserenc de Bort. These charts, which are the first of their kind, furnish a valuable and interesting summary of the splendid work done by Professor Rotch, which will always stand as one of the most important American contributions to meteorology.

Most of the twenty-four charts are concerned with wind velocities and wind pressures at different altitudes at Blue Hill. The first and the last charts will, however, doubtless have the most general "popular" interest. The former gives a vertical cross-section of the atmosphere up to a height of seven miles, and shows the greatest heights to which man has climbed or ascended in the free air; the average height of the different kinds of clouds measured at Blue Hill; the atmospheric densities at different altitudes, and the average heights in

the free air at different latitudes of the temperatures of freezing, 0° Fahr., and 30° below zero. The last chart of the set shows the best aerial routes to be followed by aviators across the North Atlantic Ocean in summer.

No one can study these excellent charts without feeling very deeply the loss which meteorology has sustained in the recent death of Professor Rotch. He truly was a pioneer in a new science. R. DEC. WARD.

Our Weather. By J. S. Fowler and William Marriott. xi and 131 pp. Maps, ills., index. E. P. Dutton & Co., New York, 1912. 35 cents. 6 x 4.

This is one of the best of the numerous small texts on meteorology which we have seen. It gives, within the compass of 131 pages, a clear, readable and accurate account of the more common meteorological phenomena and observations, with sufficient explanation for the beginner. There are only two or three things which we wish were differently stated. The deflection of the wind from the gradient is still explained in the incomplete way first suggested by Hadley. And, "when rain is frozen, hail is formed," is somewhat inaccurate, even for a very simple primer. On the whole, however, we are much pleased with the little book. It is well illustrated, pleasantly written, and covers the subject in a remarkably successful way. The authors have skilfully avoided going too far into details, and have had space enough to include mention of some human relations of the weather, weather and agriculture, and weather lore. It is worth while to note that of the ten cases at Greenwich since 1841 when the temperature has exceeded 94°, three occurred during the memorable summer of 1911 (p. 30). R. DEC. WARD.

ECONOMIC GEOGRAPHY

Les Chemins de Fer Coloniaux Français. Par R. Godfernaux. 439 pp. Maps, ills. H. Dunod & E. Pinat, Paris, 1911. 12½ x 9.

This is a handy reference work on railroads built in the French colonies. The author deals mainly with technical methods in vogue among French engineers practicing outside the boundaries of their country. The information given on the resources of the different colonies is of a very general nature and devoid of the interest which will be found in the short accounts of their economic development.

A historical sketch of the exigencies that have led to the building of the several lines precedes their study. This is followed by an account of the construction replete with tales of financial and technical difficulties. All these notes contain data of value to engineers desirous of acquiring information regarding technical practice in districts situated at remote distances from centers of civilization. Great thoroughness appears to have prevailed in the collection of figures on costs and revenues of operation. Equal care has been bestowed on the technical description of the line and the rolling stock in use. While this is not of immediate import to the geographer, the description of the districts lying on either side of the various right-of-ways are not lacking in geographical interest when coupled to a study of these same districts as affected by the lines constructed.

Some forty railroad maps scattered through the text serve to illustrate the gradual penetration of the network of steel tracks in the heart of regions but recently considered as inaccessible. Unfortunately, no scale is given on some of these maps, the incentive to consult them being thereby weakened. Barring this error of omission, their usefulness as regards the location of these oversea French railroads is not questionable. LEON DOMINIAN.

The Railway Conquest of the World. By Frederick A. Talbot. xv and 334 pp. Ills., index. J. B. Lippincott Co., Philadelphia, 1911. $1.50. 8½ x 5½.

No better measure of the physiographic aspects of the earth can be found than in the efforts of mankind to subdue them; and the railroads which have penetrated nearly every type of earth structure and climatic condition are

monuments not only of the ingenuity of mankind but also of the wonders of the physical world. In this book there may be found a vast store of information written largely from the engineer's standpoint, but of necessity portraying the varying physical features which advancing civilization is striving to subdue. Each chapter deals with a single enterprise, as "Across Siberia by Rail"; and each is extensively illustrated. The pictures are remarkable and form an invaluable feature. The history of tunnel construction centers around the boring of the Gotthard. Among other topics are the narrow-gauge railroad, an effort to reduce the cost of construction, which reaches its climax in the Otavi line in German South-West Africa; Meigg's masterpiece, the Oroya road; the penetration of Alaska; Rhodes's dream of a Cape to Cairo connection; the difficulties of the desert in building the Pilgrim Road to Mecca; the conquest of heavy rainfall in building the railroad around the lower Congo rapids; Flagler's railroad over the sea to Key West; and the first continental railroad across South America from Buenos Aires to Valparaiso. The romance connected with the construction of these great pathways of commerce is told in a popular vein. ROBERT M. BROWN.

TEXT BOOKS

The Student's Handbook of Stratigraphical Geology. By A. J. Jukes-Browne. 2nd edition. xiv and 668 pp. Maps, ills., index. Edward Stanford, London, 1912. 12s. 8 x 5½.

The new edition of this well known textbook contains numerous amplifications. The work is restricted to the geology of Europe. The British Isles have been treated with the full degree of comprehensiveness required by the stage of learning of the students for whose use the book is intended. This has not prevented the author from considering stratigraphic succession as a unit in which the strata missing in Great Britain are studied with as much detail as those represented. Thus considered, European stratigraphy is particularly well described. The physical and geographic conditions related to the formation of each of the great series of strata are discussed briefly. They have been restored cartographically in the case of the Lower Devonian, the Upper Trias and the Lower Cretaceous. This constitutes a happy innovation in English textbooks and one which, it is hoped, may be maintained. The new edition also contains more illustrations and maps than the previous one. LEON DOMINIAN.

GENERAL

The Century Atlas of the World. Prepared under the superintendence of Benjamin E. Smith, A.M., L.H.D. 45 historical and 294 geographical maps (including 168 insets) on 139 plates; index. Vol. XII of the Century Dictionary and Cyclopedia. Revised and enlarged edition, 1911. The Century Co., New York. Not sold separately. 12 x 9.

The chief value of the Century Atlas to the geographer lies in its large-scale maps of the individual states of the United States and of the provinces of Canada. In the inclusion of such maps it is not unlike other general reference atlases published and printed in the United States; it is in the more careful compilation, however, and in the superior mechanical reproduction of its maps that the Century Atlas stands out among current American atlases. Especially in this latter respect it holds a special place in American cartography; however unsuited to the highest quality of map-making the wax engraving process may be, one may well concur with Zondervan (Allgemeine Kartenkunde, 1901, note p. 157) in the opinion that the Century Atlas represents the highest type of work that this process is capable of. The credit for this work is due the Matthews-Northrup Works of Buffalo.

The states of the United States are represented on 52 plates. With a few exceptions each state is at least shown on a separate plate; in the case of the more important states, however, two or more plates are devoted to one state. The average scales employed for the various sections of the country are: New

England, 9-13 miles to the inch; Middle Atlantic States, 16 miles; Middle Western and Southern States, 22-27 miles; Rocky Mountain states, 40-50 miles; states of the Pacific Slope, 25-32 miles. Ontario, Quebec and the Maritime Provinces are shown on scales varying from 27 to 34 miles to the inch.

To these maps of the United States and Canada have been added in the new edition two instructive maps on the scale of 37 miles to the inch showing the electric railways (trolleys) of New England, the Middle Atlantic and the Central States. Large-scale maps of Alaska, Cuba, Haiti, Porto Rico, the Philippines and Hawaii respond to our special interest in these regions.

The maps of non-American territory, while very fair, have nothing special either in scale or content to commend themselves to users of such standard atlases as the Andree, Stieler, or Vivien de St. Martin. They are all characterized, however, by careful compilation and neat appearance.

Throughout the atlas this neat appearance is especially enhanced by the use of marginal instead of areal colors alone to denote political divisions and by a felicitous selection of harmonizing colors. Legibility is assured by the use of olive for relief and red for railroads. Relief is shown by contours and hachures on the maps of the United States, Canada and Mexico, and by hachures alone on the others. Other valuable features of the atlas are the delineation of steamship routes on the larger scale maps, the use of isobaths, and the representation of explorers' routes on the general maps. Mention should also be made of the extremely convenient size of the atlas which allows of easy reference.

A short section devoted to historical maps and an index containing 180,000 names complete the atlas.

The Century Atlas, which has been constantly revised since its inception in 1897, especially in 1899 and 1901, may therefore in its present edition be considered as representing a material advance towards the realization of that desideratum, an American atlas for general reference which satisfies the requirements both of scientific and of technical standards. W. L. G. J.

Mathematische Geographie. Von Prof. Dr. Hermann J. Klein. Dritte verbesserte Auflage. 261 pp. Diagrams, index. J. J. Weber, Leipzig, 1911. Mk. 2.50. 7½ x 4½.

A useful little handbook. The bits of history of science are the most interesting parts of a work neither better nor worse in form of presentation than most books of its kind. Its readers will probably be in quest of knowledge, willing to work and not too expectant of amenities of style. But why call it *geography?* My name for it would be terrestrial astronomy or terrestrial mathematics. Not strange that it should have this character, as Dr. Klein is an astronomer. Form and motion of the earth, gravity, precession, nutation, globes and maps are his topics. Why include *precession* and *nutation* in mathematical geography? Why omit the customary tides?

There is a very general tendency nowadays to make biological reactions essential to geography, to insist that the earth, as it were, *account for its inhabitants.* The form of the earth affects them, so do its weight and motions, but the bearing of precession and nutation on plant or animal must be rather remote. The treatment here is frankly astronomical, which may fairly be objected to as long as geography is in the title.

What is the proper subject of mathematical geography? Map-making, gravity, day and night (rather than *rotation*), seasons (rather than revolution of the earth); anything geographical under some one of the modern conceptions is mathematical geography when mathematically treated. *Geographical,* however, should not be regarded as equivalent to *terrestrial.* MARK JEFFERSON.

The Association of History and Geography. By A. J. Berry. 171 pp. Blackie & Sons, Ltd., London, 1911. 1s. 6d. 7 x 5.

History has the first place in the title of this interesting little volume as well as in the author's mind. Its geography is of the type now passing away. There can be no doubt of Mr. Berry's intimacy with much history, while nothing in the book compels us to suppose he has any knowledge of modern physiography

whatever. The use he makes of even the older geography is at times astonishing. On p. 52, speaking of the Romans and the gaps by which they passed the Alps, he says: "The St. Bernard Pass, which is of present commercial importance as leading to the Rhine, was not used by the Romans. They travelled by the Julier Pass to meet the Valley of the Inn, which enabled them to arrive at the headwaters of the Rhine." The student who looks up the two passes on his map will surely be puzzled.

The strong point of the book is a wealth of illustrations of the history that lies behind familiar geographic place-names and even buildings. Particularly for England and London is this true. There are many interesting bits on the history of discovery and exploration, and lines of march and migration. Doubtless, this was the author's main object. The account of the Holy Land appeals to the geographer more than anything else in the book. For its length, it is excellent.

The author suggests that geography might tell not only *where?* but *why there?* Perhaps he is not aware how much further he might have gone in that direction. Compare his historic account of Rome with the physiographic one of W. M. Davis in *The Journal of Geography*, 1911, p. 197, and with J. G. Kohl's geographic treatment in *Die Haupstaedte Europas*, Leipzig, 1864, p. 39, or, better still, his account of London, with its admirable elucidation of place-names, and that of Kohl, analyzing the advantages of the site. Thus it happens that an excellent little book leaves a geographer discontented. MARK JEFFERSON.

The Outlines of Military Geography. By Col. A. C. McDonnell. Vol 1: xiii and 227 pp. Index. Vol. 2: Maps. Hugh Rees, Ltd., London, 1911. 12s. 6d. 8½ x 6.

If serious war comes upon Great Britain it is to be hoped she will turn rather to her University men than to Col. MacDonnell for advice in geographical matters. His geography is old-timish and superficial. There are many interesting items in his book, especially the account of the Northwest boundary of India, with the excellent map of Persia and Afghanistan. It is a pity that this map fails to show 7 per cent. of the places referred to there and that another 16 per cent. are spelled one way in the map and another in the text. It is, however, too much a list of disconnected items. There appears to be no understanding of the earth's relief. Thus at p. 24 he writes of the roads between the French Alps and Mantua, without mention of the Po Valley as a unit lowland between mountains: "It is a remarkable thing, but the roads here along this line are compressed into a narrow kind of neck between Milan and Piacenza only 40 miles wide." The maps fail to show many of the places referred to, the worst being that of France. The proofreading of geographical names is singular:—Bohemia forest, Riesingebirge (twice), Maine, once for Marne and often for Main, river Hudson, Shimla, Kustenjo and Jada Bay. In no sense a strong book. MARK JEFFERSON.

Monograph of the Okapi. By Sir E. Ray Lankester. Atlas of 48 plates compiled with the assistance of W. G. Ridewood. viii pp. British Museum, London, 1910. 25s. 12½ x 9½.

We learn with extreme regret that "it is doubtful whether the atlas will be followed by a volume of text at a late date." To be sure the monograph by Fraipont is such as abundantly to cover the subject, and the literature has already become considerable. But those who recall the zeal with which Sir Ray Lankester threw himself into the study of this rare animal when its existence was first made known, who remember how the acquisition of new specimens seemed to force into consideration a new adjustment of the value of variation in individuals as critical of class variety, will feel a sense of loss in that this distinguished authority has not expressed himself in text as completely as he has done in picture. These plates offer a very full record of the important features of okapi osteology. They are singularly rich in illustration of the characteristic stripes of the legs. WILLIAM CHURCHILL.

OTHER BOOKS RECEIVED

NORTH AMERICA

ARKANSAS STATE SUPPLEMENT. By Rose Bland. Tarr & McMurry's New Geographies. 32 pp. Maps, ills. Macmillan Co., New York, 1912. 25 cents. 9½ x 7½. [An elementary geographic study of the State of Arkansas. The text lacks a good map.]

THE SCOT IN AMERICA AND THE ULSTER SCOT. Being the substance of addresses before the Edinburgh Philosophical Institution, 1st November, 1911, and the Presbyterian Historical Society, Belfast, 26th March, 1912. By Whitelaw Reid. 67 pp. Macmillan Co., New York, 1912. 40 cents. 8 x 5½. [A review of the doings of some Scotch pioneers in America.]

AFRICA

GOMERA, DIE WALDINSEL DER KANAREN. Reisetagebuch eines Zoologen. Von Walther May. ix and 214 pp. Maps, ills. Reprint, *Verhandl. des Naturwiss. Vereins in Karlsruhe.* Vol. 24. G. Braunsche, Karlsruhe, 1912. Mk. 3. 10 x 6½. [The general geography of this ill-known island is ably described on the basis of a season's work. Contains zoological, botanical, geological and ethnographical notes.]

THE MAN-EATERS OF TSAVO AND OTHER EAST AFRICAN ADVENTURES. By Lieut.-Col. J. H. Patterson, with a foreword by Frederick Courteney Selous. xx and 351 pp. Ills. Macmillan Co., New York, 1912. 50 cents. 7 x 5. [A new and cheaper edition of this well-known book. Thrilling experiences of African hunting and the story of the man-eating lions' attack upon the laborers of the Uganda R.R.]

DIE UNTERE KREIDE VON DEUTSCH-OSTAFRIKA. Dissertation. Von Dr. Erich Krenkel. 50 pp. Ills. Königl. Bayer. Ludwigs-Maximilians-Universität zu München, 1911. 13 x 10. [The faunal characteristics of the Lower Cretaceous in German East Africa are described in detail.]

ASIA

LA CITÉ ÂNNAMITE. Tome Second. Les Sédentaires. Par Camille Briffaut. xii and 133 pp. Librairie de la Soc. du Recueil Sirey, Paris, 1912. Frs. 4. 9 x 5½. [An excellent description of the Sino-Annamitic type with an account of his social progress.]

THE ENGLISH FACTORIES IN INDIA. 1637-1641. A Calendar of Documents in the India Office, British Museum, and Public Record Office. By William Foster. xlvi and 339 pp. Index, ills. Clarendon Press, Oxford, 1912. 12s. 6d. 9 x 6½. [A new instalment of detailed insight in the early commercial activities of the English in India.]

KINA OCH JAPAN. Studier af August Strindberg. 86 pp. Björck & Börjesson, Stockholm, 1911. 9 x 6. [A contribution to the comparative study of the Chinese and Japanese languages.]

PALESTINE AND SYRIA, with routes through Mesopotamia and Babylonia and the Island of Cyprus. Handbook for Travellers. By Karl Baedeker. civ and 461 pp. 21 maps, 56 plans, panorama of Jerusalem, index. 5th edition, remodelled and augmented. Karl Baedeker, Leipzig, 1912. 6½ x 4½. [A large selection of useful information. Maps well drawn and informatory. Usual standard of excellence maintained.]

THE SOUL OF THE FAR EAST. By Percival Lowell. x and 226 pp. Ills. Macmillan & Co., New York, 1911. $1.60. 8 x 5½. [A reprint.]

DIE REISE DES ARABERS IBN BATÛTA DURCH INDIEN UND CHINA. (14. Jahrhundert). Bearbeitet von Dr. Hans von Mžik. In series, Bibliothek denkwürdiger Reisen. 490 pp. Maps, index. Gutenberg-Verlag, Berlin, 1911. Mk. 9. 9 x 6. [The travels of Ibn Batûta are considered as a phase of the commercial intercourse between Arabia and the Far East.]

AUSTRALASIA

NEUSEELAND NACH SEINER GESCHICHTE UND SEINER NATUR, sowie der materiellen und intellektuellen Entwicklung. Dissertation. Von M. F. Blassneck. viii and 138 pp. Map. Bonn, 1908. [A condensed monograph on the island.]

STATISTICS OF THE STATE OF QUEENSLAND FOR THE YEAR 1910. (In ten parts and index.) Compiled from official records in the government statistician's office. By Thornhill Weedon. Government Statistician, Brisbane, 1911. 12s. 6d. 13 x 8½. [The statistics relate to population, commerce, finance, law and crime, government and production, etc.]

DIE WIRTSCHAFTSORGANISATION DER MAORI AUF NEUSEELAND. Von Waclaw von Brun. In series, Beiträge zur Kultur-und Universalgeschichte. 18. Heft. x and 119 pp. R. Voigtländer, Leipzig, 1912. Mk. 4. 9 x 6. [A study of social conditions among the Maori.]

EUROPE

DIE ALPEN. Von Hermann Reishauer. In series: Aus Natur und Geisteswelt, Vol. 276. 140 pp. Maps, ills., index. B. G. Teubner, Leipzig, 1909. Mk. 1.25. 7 x 5. [An elementary regional description of these mountains.]

LES ALPES DE PROVENCE. Guide du Touriste, du Naturaliste et de l'Archéologue. Par Gustave Tardieu. vi and 303 pp. Map, ills., index. Masson et Cie, Paris, 1912. Frs. 4.50. 7 x 4½. [A suggestive handbook for the observer visiting this region. The picturesque aspect of the land, its natural history and archæology are briefly described.]

BEAUTIFUL BRITAIN. (a) Isle of Man. By Joseph E. Morris. 63 pp. (b) North Wales. By Joseph E. Morris. 64 pp. (c) The Isle of Wight. By G. E. Mitton. 64 pp. Index and ills. in each. Macmillan Co., New York, 1911. 75 cents each. 9 x 6½. [Full of interesting regional information.]

BELGIUM, THE LAND OF ART. Its History, Legends, Industry and Modern Expansion. By William Elliot Griffis. xii and 310 pp. Ills., index. Houghton Mifflin Co., Boston, 1912. $1.25. 7½ x 5. [The history of Belgium, its legends, industry and modern expansion are reviewed in a general way. The book will enable one to form an adequate conception of these subjects without burdening the mind with items required by the specialist.]

HANDBOOK TO BELGIUM, including The Ardennes and Luxemburg. 6th edition, revised and enlarged. 240 pp. Maps, plans, ills., index. Ward Lock & Co., Ltd., London, 1912. 2s. 6d. 7 x 4. [Contains practical information for the traveler.]

JAHRBUCH ÜBER DIE DEUTSCHEN KOLONIEN. Herausgegeben von Dr. Karl Schneider. 5. Jahrgang. 274 pp. Maps, index. G. D. Baedeker, Essen, 1912. Mk. 5. 9 x 6. [An excellent yearly resumé of general progress in German colonies. Particular attention paid to economics.]

PALERMO. Storia, Monumenti, Industria, Commercio, Arti, Istituzioni, Scienze, Dintorni. In series: Le Città d'Italia Illustrate. 92 pp. Ills. Soc. Editrice Sonzogno, Milan, 1912. L. 1.25. 11 x 8. [The description of this city includes much that is worth knowing about its past and present.]

ROM UND DIE CAMPAGNA. Von Th. Gsell Fels. 7. Auflage, Meyers Reisebücher. xvi and 1083 pp. Maps, ills., index. Bibliographisches Institut, Leipzig, 1912. International News Co., New York, N. Y. Mks. 12.50. 7 x 5. [A detailed description of the Holy City and its environs. Many maps.]

HISTORICAL

ANCIENT ASSYRIA. By C. H. W. Jones. Cambridge Manuals of Science and Literature. vii and 175 pp. Map, ills., index. G. P. Putnam's Sons, New York, 1912. 6½ x 5. [An elementary sketch of Assyrian history.]

GENERAL

THE RAILWAY LIBRARY. 1910. (Second Series.) A Collection of Noteworthy Addresses and Papers mostly Delivered or Published During the Year Named. Compiled and Edited by Slason Thompson. 456 pp. Bureau of Railway News and Statistics, Railway Exchange Building, Chicago, 1911. 8½ x 6. [Various phases of the transportation problem discussed by experts. Much space devoted to the question of efficiency in railroad management.]

SPIDERS. By Cecil Warbuton. Cambridge Manuals of Science and Literature. x and 136 pp. Ills., index. G. P. Putnam's Sons, New York, 1912. 40 cents. 6½ x 5. [Describes the habits and modes of life of the commoner spiders.]

DIE KULTUR DER KULTURLOSEN. Ein Blick in die Anfänge menschlicher Geistesbestätigung. Von Dr. Karl Weule. 99 pp. Ills. Franckh'sche Verlagshandlung, Stuttgart, 1912. Mk. 1. 8½ x 5½. [A suggestive study on the origin of human civilization by reference to present day methods of life among the least civilized races of the earth.]

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NEW MAPS

EDITED BY THE ASSISTANT EDITOR

MAPS ISSUED BY UNITED STATES GOVERNMENT BUREAUS

U. S. GEOLOGICAL SURVEY

Topographic Sheets
(Including Combined and Special Topographic Maps)

California. (a) Dry Creek Quadrangle. Surveyed in 1910. 1:31,680. 39°37′30″ - 39°30′0″ N.; 121°45′0″ - 121°37′30″ W. Contour interval 5 ft. Edition of June 1912.

(b) Keefers Quad. Surveyed in 1910. 1:31,680. 39°52′30″ - 39°45′0″ N.; 121°52′30″ - 121°45′0″ W. Interval 5 ft. Edit. (preliminary) of June 1912.

(c) McKittrick Quad. Surveyed in 1907-1910. 1:125,000. 35°30′ - 35°0′ N.; 120°0′ - 119°30′ W. Interval 100 ft. Edit. of June 1912.

(d) Nelson Quad. Surveyed in 1910. 1:31,680. 39°37′30″ - 39°30′0″ N.; 121°52′30″ - 121°45′0″ W. Interval 5 ft. Edit. of May 1912.

(e) Newhard Quad. Surveyed in 1904 and 1910. 1:31,680. 39°37′30″ - 39°30′0″ N.; 122°0′0″ - 121°52′30″ W. Interval 5 ft. Edit. of May 1912.

(f) Oroville Quad. Surveyed in 1910. 1:31,680. 39°37′30″ - 39°30′0″ N.; 121°37′30″ - 121°30′0″ W. Interval 5 ft. Edit. (preliminary) of May 1912.

(g) Singer Creek Quad. Surveyed in 1910. 1:31,680. 40°0′0″ - 39°52′30″ N.; 122°0′0″ - 121°52′30″ W. Interval 5 ft. Edit. (preliminary) of June 1912.

California-Nevada. Ivanpah Quad. Surveyed in 1909-1910. 1:250,000. 36°0′ - 35°0′ N.; 116°0′ - 115°0′ W. Interval 100 ft. Edit. of June 1912.

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Maine. Livermore Quad. Surveyed in 1910. 1:62,500. 44°30′ - 44°15′ N.; 70°15′ - 70°0′ W. Interval 20 ft. Edit. of May 1912.

Montana. Thibedeau Lake Quad. Surveyed in 1909. 1:125,000. 49°0′ - 48°30′ N.; 110°0′ - 109°30′ W. Interval 20 ft. Edit. of June 1912.

New York. (a) Hammond Quad. Surveyed in 1908-1910. 1:62,500. 44°30′ - 44°15′ N.; 75°45′ - 75°30′ W. Interval 20 ft. Edit. of April 1912.

(b) McKeever Quad. Surveyed in 1910. 1:62,500. 43°45′ - 43°30′ N.; 75°15′ - 75°0′ W. Interval 20 ft. Edit. of June 1912.

(c) New Berlin Quad. Surveyed in 1910. 1:62,500. 42°45′ - 42°30′ N.; 75°30′ - 75°15′ W. Interval 20 ft. Edit. of June 1912.

Ohio. (a) Laurelville Quad. Surveyed in 1910. 1:62,500. 39°30′ - 39°15′ N.; 82°45′ - 82°30′ W. Interval 20 ft. Edit. of June 1912.

(b) Muskingum County, Ohio. Surveyed in 1907-1909. 1:62,500. 40°10′0″ - 39°45′30″ N.; 82°14′0″ - 81°41′30″ W. Interval 20 ft. Edit. of May 1912. [See note under 'Kentucky.']

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(b) Quafryville Quad. Surveyed in 1910. 1:62,500. 40°0′ - 39°45′ N.; 76°15′ - 76°0′ W. Interval 20 ft. Edit. of June 1912.

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(b) Naugatuck Quad. Surveyed in 1910. 1:62,500. 38°0′ - 37°45′ N.; 82°30′ - 82°15′ W. Interval 50 ft. Edit. (preliminary) of June 1912.

(c) Pineville Quad. Surveyed in 1910. 1:62,500. 37°45′ - 37°30′ N.; 81°45′ - 81°30′ W. Interval 50 ft. Edit. of April 1912.

(d) Pounding Mill Quad. Surveyed in 1909-1910. 1:62,500. 37°15′ - 37°0′ N.; 81°45′ - 81°30′ W. Interval 50 ft. Edit. (preliminary) of April 1912.

(e) Welch Quad. Surveyed in 1909-1910. 1:62,500. 37°30′ - 37°15′ N.; 81°45′ - 81°30′ W. Interval 50 ft. Edit. of April 1912.

Geologic Sheets Accompanying Folios of the Geologic Atlas of the United States

Maryland. Choptank Quadrangle. Surveyed in 1905-1910. 1:125,000. 39°0′ - 38°30′ N.; 76°30′ - 76°0′ W. Areal Geology. Contour interval 10 ft. 9 colors. Edit. of Jan. 1912. Accompanies "Choptank Folio (No. 182)" by B. L. Miller, 1912.

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Pennsylvania. Burgettstown Quad. Surveyed in 1904. 1:62,500. 40°30′ - 40°15′ N.; 80°30′ - 80°15′ W. Interval 20 ft. Edit. of Aug. 1910. (a) Areal Geology. 7 colors. (b) Structure and Economic Geology. 7 colors. (c) Oil and Gas. 4 colors.

Carnegie Quad. Surveyed in 1903-1904. 1:62,500. 40°30′ - 40°15′ N.; 80°15′ - 80°0′ W. Interval 20 ft. Edit. of Dec. 1910. (a) Areal Geology. 9 colors. (b) Structure and Economic Geology. 9 colors. (c) Oil and Gas. 5 colors.

Accompany "Burgettstown-Carnegie Folio (No. 177)" by E. W. Shaw and M. J. Munn, 1911.

Pennsylvania. Foxburg Quad. Surveyed in 1905-1907. 1:62,500. 41°15′ - 41°0′ N.; 79°45′ - 79°30′ W. Interval 20 ft. Edit. of Dec. 1910. (a) Areal Geology. 10 colors. (b) Structure and Economic Geology. 12 colors. (c) Oil and Gas. 4 colors.

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Accompany "Foxburg-Clarion Folio (No. 178)" by E. W. Shaw and M. J. Munn, 1911.

Maps Accompanying Publications

Pennsylvania. (a) Geologic structure of the Foxburg, Clarion, Kittanning and Rural Valley quadrangles shown by contours on the Vanport limestone. [1:375,000]. 41°15′ - 40°45′ N.; 79°45′ - 79°15′ W. Contour interval 50 ft.

(b) Probable preglacial drainage of the northwestern part of the Foxburg quadrangle. [1:125,000]. [41°15′ - 41°3′ N.; 79°45′ - 79°35′ W.]

(c) Structure of the oil bearing sands and of the rocks at the surface of the Foxburg and Clarion quadrangles. [1:387,000]. [41°15′ - 41°0′ N.; 79°45′ - 79°15′ W.]

Accompany, as Figs. 7, 9 and 12, "Foxburg-Clarion Folio (No. 178)," 1911, *Geol. Atlas of the U. S.*

Pennsylvania. (a) Unsymmetrical drainage of Burgettstown and Carnegie quadrangles, showing long tributaries flowing southeast and short tributaries flowing northwest. [1:250,000]. [40°30′ - 40°15′ N.; 80°30′ - 80°0′ W.]

(b) Sketch map showing the probable preglacial drainage of western Pennsylvania. [1:3,000,000]. [42°40′ - 41°20′ N.; 81°0′ - 78°20′ W.]

Accompany, as Figs. 3 and 7, "Burgettstown-Carnegie Folio (No. 177)," 1911, *Geol. Atlas of the U. S.*

[Map (b) occurs also as Fig. 8 in Folio No. 178.]

NORTH AMERICA

CANADA

BRITISH COLUMBIA. Tongue of Sir Sandford Glacier (Selkirk Range), showing position of stones for determining ice flow. From a photographic survey based on triangulation. By Howard Palmer. 1911. 1:20,000. [51°41′ N. and 117°53′ W.]. Accompanies, on p. 450, "Observations on Sir Sandford Glacier, 1911" by H. Palmer, *Geogr. Journ.*, Vol. 39, No. 5, 1912, pp. 446-453.

[Cf. map listed under "Canada" (sixth entry) in *Bull.*, Vol. 43, 1911, p. 230.]

AFRICA

EGYPT. [Seventeen sheets (listed from N. to S. and from left to right) of the topographic map of] Egypt. 1:50,000. 3 to 4 colors. Survey Dept. of Egypt, Cairo. All except (7) second edition, 1910-11. (1) Sheet III-IV N.E. (Tel el Kebîr). 30°36′ - 30°24′ N.; 31°45′ - 32°0′ E. (2) III-V N.E. (Nefisha). 30°36′ - 30°24′ N.; 32°0′ - 32°15′ E. (3) III-VI N.E. (Isma'ilia). 30°36′ - 30°24′ N.; 32°15′ - 32°30′ E. (4) II-III N.E. (Gheita). 30°24′ - 30°12′ N.; 31°30′ - 31°45′ E. (5) II-VI N.E. (Great Bitter Lake). 30°24′ - 30°12′ N.; 32°15′ - 32°30′ E. (6) II-VII N.E. (Little Bitter Lake). 30°24′ - 30°12′ N.; 32°30′ - 32°45′ E. (7) I-I N.W. (Qatta). 30°12′ - 30°0′ N.; 30°45′ - 31°0′ E. (8) I-II N.E. (Cairo East). 30°12′ - 30°0′ N.; 31°15′ - 31°30′ E. (9) I-VII N.E. (Shallûfa). 30°12′ - 30°0′ N.; 32°30′ - 32°45′ E. (10) I-I S.E. (Giza Pyramids). 30°0′ - 29°48′ N.; 31°0′ - 31°15′ E. (11) I-II S.E. (Helwan). 30°0′ - 29°48′ N.; 31°15′ - 31°30′ E. (12) I-VI S.E. (G[ebel] Etâqa). 30°0′ - 29°48′ N.; 32°15′ - 32°30′ E. (13) I-VII S.E. (Suez). 30°0′ - 29°48′ N.; 32°30′ - 32°45′ E. (14) II-I S.E. (Dahshûr). 29°48′ - 29°36′ N.; 31°0′ - 31°15′ E. (15) II-II S.E. ('Ayat). 29°48′ - 29°36′ N.; 31°15′ - 31°30′ E. (16) III-I S.E. (Reqqa). 29°36′ - 29°24′ N.; 31°0′ - 31°15′ E. (17) III-II S.E. (Saf). 29°36′ - 29°24′ N.; 31°15′ - 31°30′ E.

[Relief in brown contours, sand in brown stippling, hydrography and canals in blue, drains in green, vegetation in green. Sheets (3), (5), (6) and (9) contain portions of the Suez Canal.

The sheets of this standard topographic map of Egypt are designated by the quadrant into which they fall, the meridian of 31° E. and the parallel of 30° N. (Cairo) being used as the ordinate and abscissa, respectively, of this division, and are numbered, in latitude, northward and southward from the abscissa, and in longitude, eastward and westward from the ordinate. Cf. the index map listed under "Egypt (b)", in *Bull.* for June, p. 557. Previous sheets listed under "Egypt", *Bull.*, Vol. 43, 1911, pp. 78 and 391.]

AUSTRALASIA AND OCEANIA

MELANESIA. Melanesia: To illustrate the paper by W. H. R. Rivers. 1:10,000,000. 2°30′ - 23°0′ S.; 148°30′ E. - 179°0′ W. 2 colors. With two insets: (1) Eddystone Island (Mandegusu). 1:100,000. 8°16′ S. and 156°30′ E. 2 colors: (2) San Cristoval. 1:2,500,000. 10°30′ S. and 162°0′ E. 2 colors. Accompanies "Island Names in Melanesia" by W. H. R. Rivers, *Geogr. Journ.*, Vol. 39, No. 4, 1912, pp. 458-468.

[An attempt to systematize the nomenclature of the islands of Melanesia. The native names are given of all islands having European names.]

EUROPE

ITALY. (a) La malaria in Basilicata secondo dati fornati dal Dott. Pica, Medico Provinciale di Potenza. 1:500,000. 41°9′ - 39°54′ N.; 15°25′ - 16°55′ E. 4 colors.

(b) La Malaria in Calabria secondo dati raccolti dal Prof. Gosio. 1:500,000. 40°12′ - 37°51′ N.; 15°35′ - 17°20′ E. 5 colors.

Istituto Geografico de Agostini, Novara.

[Valuable maps showing (map *a*, areally, map *b*, by place-dots) the regions affected by malaria in these southern provinces of Italy.]

POLAR

KERGUELEN ISLAND. Kerguelen Island to illustrate notes by Commander Theodor Ring (Norwegian R.N.R.). 1:1,500,000. 48°30′ - 49°50′ S.; 68°25′ - 70°43′ E. Accompanies, on p. 495, "The South and West Coasts of Kerguelen Island," *Geogr. Journ.*, Vol. 39, No. 5, 1912, pp. 493-495.

[Valuable new survey of the S. and W. coasts of the island, correcting present charts.]

ATLASES*

STUFENATLAS FÜR HÖHERE LEHRANSTALTEN. Herausgegeben von Prof. H. Fischer und Dr. M. Geistbeck. In drei Stufen. 1. Unterstufe, 30 pp. 2. Mittelstufe, 54 pp. 3. Oberstufe, 106 pp. Velhagen & Klasing, Leipzig, 1912. Mk. 2.20. 12 x 9½. [This series of text-books is well suited to lead the student gradually

* Prepared by L. Dominian.

to a clear understanding of the purpose of geography as well as to the interpretation of scientific facts as revealed by maps. The first book supplies elementary notions of geography based on politico-regional subdivisions. In the second, attempt is made at the very start to teach fluent map-reading. The value of physiography is suggested. The insertion of special maps draws the student's attention to the geographic phase of other sciences. The third part may be considered as the final preparatory accompaniment to an advanced course in geography. Stress is placed on the necessity of familiarity with topographic structure as revealed by cartography. Sections of maps and charts published by German government bureaus are shown. The economic features of geography are emphasized. This part also contains a systematic scheme of classification for which the various maps are grouped in sets irrespective of their paginal sequence.]

ATLAS CLASSIQUE. Par G. Niox et M. Fallex. Avec une partie historique par E. Darsey. Édition de 88 Feuilles. Index. Ch. Delagrave, Paris, 1911 (?) [The maps in this school atlas are particularly good as regards legibility of the text. They are preceded by a full page of illustrated notes on the various systems of geographic projections in use. The relation of content to scale is lucidly explained by a set of nine maps of the same locality drawn on a decreasing scale. The physical phase of geography has been carefully treated within the scope of the work. Elementary notions of the subdivisions of the science are also conveyed to the student's mind by a set of special maps. In conformity with the time-honored association of geography and history in France the publishers have seen fit to insert a large number of historical maps referring to some of the leading events of world history from the earliest times to the beginning of the nineteenth century.]

CITIZEN'S ATLAS OF THE WORLD. Edited by J. G. Bartholomew. 156 pp., maps, plans, index, gazetteer and geographical statistics. John Bartholomew & Co., Edinburgh, 1912. 25s. 14½ x 10. [This atlas is thoroughly up-to-date. The polar charts have been prepared in the light of the latest explorations with the exception of Amundsen's final discovery. African boundaries are laid out according to the most recent treaties. In Oceania the insular groups have been separated by maritime boundaries. Transportation, both overland and oversea, has been carefully treated both as regards existing and projected routes. The proposed tracks of the transcontinental railroads in Canada and Australia are shown. It is especially in the presentation of general information of economic importance that the atlas will be found valuable. The insertion of commercial charts of the world's larger parts and of a map entitled "Commerce" depicting the various stages of present commercial developments throughout the world constitute particularly commendable features. The execution of the several sheets is adequate In the general index, coordinates are given for each of the localities mentioned. A descriptive gazetteer of the world is appended. As a work of reference the atlas will admirably fill the needs of the average consultant.]

ATLAS HISTÓRICO DE LA REPÚBLICA ARGENTINA. Recopilado y redactado por José Juan Biedma y dibujado por Cárlos Beyer. xix and 56 pp. Angel Estrada y Cia, Buenos-Aires, 1909. 14½ x 12. [This cartographic contribution to the history of the Argentine Republic also contains similar information regarding the other South American countries whose history is interwoven with that of the former. The maps are accompanied by a brief historical commentary. Many are devoted to the representation of military events. The first three refer to the period of discovery. Plate II in particular shows the route of the four voyages undertaken by Columbus between 1492 and 1504. The gradual extension of colonization from Central America in a N-S direction is next illustrated. The growth of Spanish colonial power to the beginning of its decline in the first years of the XIXth century is admirably revealed by the extensions and recessions of Spanish territory, on the South American continent. The sanguinary period between 1800 and 1825 is recorded by a large number of battlefield sketches. The Brazilian campaign of 1826-1828 and the war against Paraguay (1865-1870) are also illustrated by means of maps. A map of special interest is that of the campaigns against the Indians from 1814 to 1861. Much pains have been taken to ensure adequate cartographic expression of the data.]